DOCUMENT A00805

APPENDIX C GEO-TECH REPORT AND BORING LOGS

Moning Massachusetts Forward DOT

Project No. 604428

Highway Division

APPENDIX C

GEOTECHNICAL DATA REPORT (INCLUDING SOIL BORING LOGS) SILVER LINE GATEWAY CHELSEA, MA

GEOTECHNICAL DATA REPORT

Subsurface Investigation Results for the MassDOT Silver Line Chelsea Extension Chelsea, MA

June 2014

I. INTRODUCTION

A subsurface investigation was conducted to support the design and construction of the MBTA Silver Line Chelsea Extension project in Chelsea, Massachusetts. The subsurface investigation consisted of a general review of the local geology, the drilling and sampling of 63 test borings, the installation of ten monitoring wells, in-situ permeability testing, and the collection and laboratory testing of geotechnical and environmental soil samples and.

The test borings were drilled by Northern Drill Service of Northborough, Massachusetts from November 20, 2013 to February 3, 2014 and logged by an AECOM geotechnical representative. The laboratory testing of collected geotechnical soil samples was performed by GeoTesting Express of Acton, Massachusetts.

An environmental soil pre-characterization study was conducted in tandem with the geotechnical subsurface investigation. Results of the environmental study are provided under separate cover and are not discussed in this data report.

II. PROJECT DESCRIPTION

The purpose of the Silver Line Gateway project is to extend Silver Line Bus Rapid Transit (BRT) service from Boston's South Station and Seaport District to Chelsea and East Boston. The new route would run along the existing Silver Line route to the Blue Line Airport Station and then north and west on existing roads (i.e., *Coughlin Bypass and across the Chelsea Street Bridge*). The route selected for the project will include an out-of-service rail Right-of-Way (ROW) and a portion of the active commuter rail ROW to a terminal station at the Mystic Mall.

The project will include an approximately 1.2 mile long dedicated Bus Way, four new Bus Rapid Transit (BRT) Stations, a Shared Use Path and relocation and reconstruction of the MBTA Chelsea Commuter Rail Station. The project will also include new traffic signals, upgrades to

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existing MBTA Commuter Rail Signal System, and replacement of the structurally deficient Washington Avenue Bridge.

III. SUBSURFACE EXPLORATION PROGRAM

A total of 63 test borings were drilled during the subsurface investigation. The test borings ranged in depth from approximately 10 to 110 feet. The test borings were advanced using 4-inch ID HW casing or 3.25-inch ID hollow stem augers. Standard penetration test split spoon soil samples were typically collected at 5-foot intervals and logged by an AECOM field representative in accordance with ASTM standards (ASTM D2488). Thin-walled Shelby or Osterberg tube samples were also taken of the fine-grained soils.

Bedrock was encountered and cored at one boring location (B-47). The B-47 rock core was collected using an NX size core barrel and its in-situ quality determined by calculating the percent recovery and Rock Quality Designation (RQD).

Ten test borings were converted to observation wells upon completion. The test borings not converted to observation wells were backfilled with drill cuttings or a bentonite-cement grout mix. The use of drill cuttings as backfill was restricted to the shallow borings (≤ 30 ft).

The locations of the test borings are shown on Figure 1. The test boring logs from the subsurface investigation are provided in Attachment 1. Survey location data for the borings are summarized in Table 1.

a. OBSERVATION WELLS

The ten observation wells were constructed using Schedule 40 PVC riser and screen, a sand pack, bentonite seal and protective steel road-box. The observation well installation logs are provided in Attachment 2.

Groundwater levels measured in the observation wells during the subsurface investigation ranged from artesian (*i.e.*, *above grade*) to 14.2 feet below ground surface. It should be noted that groundwater levels may fluctuate with precipitation, season, construction activities, run-off controls, and other hydraulic factors. As a result, water levels during construction may vary from those observed during the subsurface investigation. A summary of the groundwater level measurements recorded through May 2014 is provided in Table 2.

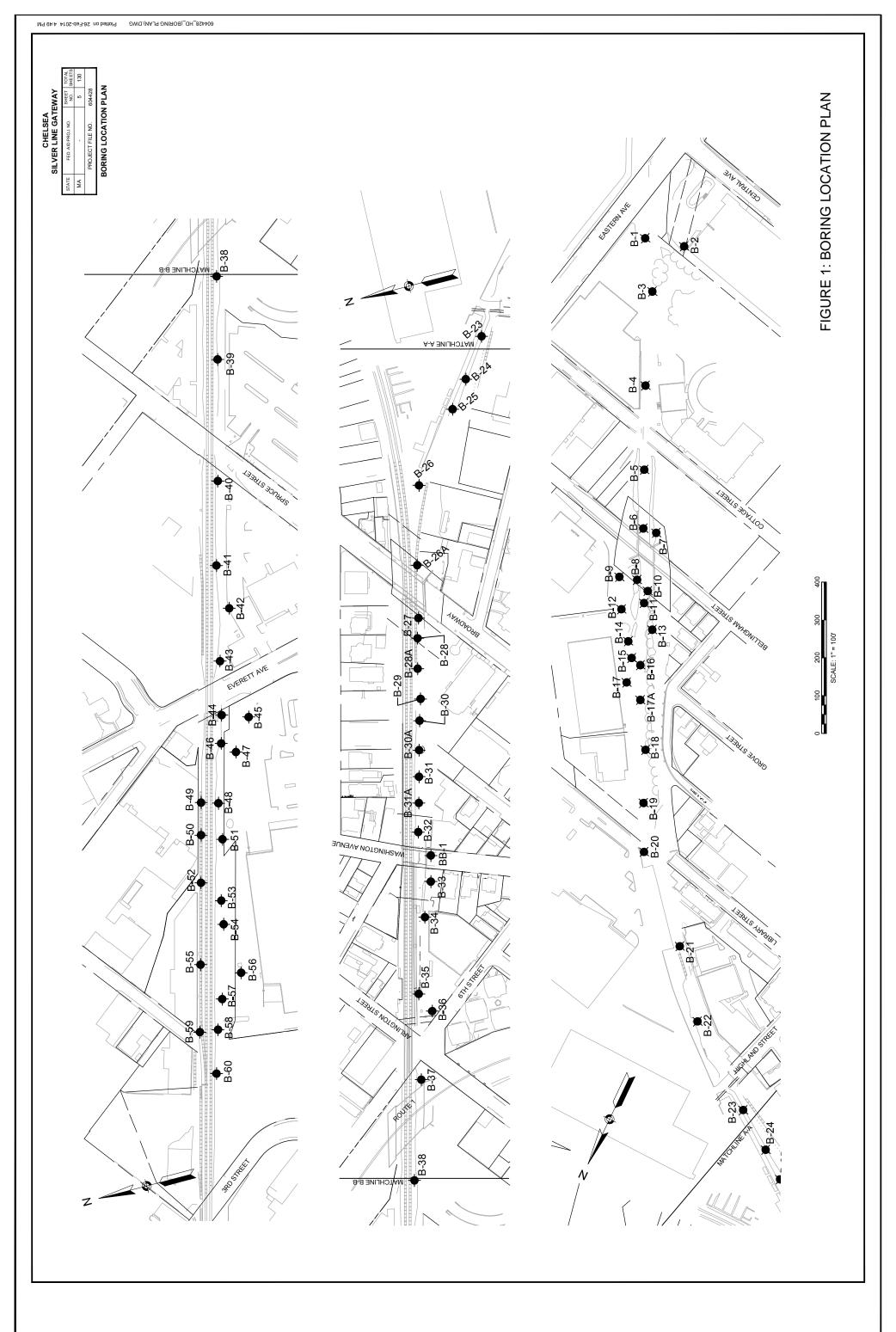
b. FALLING HEAD TESTS

One or two stage falling head tests were conducted at six boring locations to observe the hydraulic response of saturated and unsaturated soils. The Stage 1 falling head tests were performed by seating the casing at the test interval (*i.e., flush with the bottom of the borehole*), flushing and filling the casing with clean sediment-free water and recording the drop in head at regular intervals. Once the Stage 1 test was completed, a split spoon sample was driven and withdrawn and a Stage 2 falling head test was performed after topping the casing with clean water. The falling head test data and analyses are provided in Attachment 3.

c. LABORATORY TESTING

A laboratory testing program was performed to determine the engineering properties of encountered site soils and rock. Representative soil samples were selected and tested for physical characteristics (*i.e. moisture content, organic content, Atterberg limits, gradation, shear strength, consolidation, modified proctor and CBR*) and chemical corrosion characteristics (*i.e., resistivity, chloride content, sulfate content and pH*). A rock core sample collected at the B-47 boring location was tested for axial compression. A summary of the soils and rock laboratory testing are provided in Table 3. The laboratory test results are provided in Attachment 4.

FIGURES



TABLES

TABLE 1: BORING LOCATION SURVEY DATA

		COORD	INATES	
BORING	GROUND SURFACE ELEVATION (ft)	NORTHING	EASTING	BORING DEPTH (ft)
B-1	8.4	2966956	784830	21
B-2	10	2966931	784728	27
B-3	9.1	2967075	784752	27
B-4	11.8	2967307	784661	12
B-5	10.7	2967509	784568	21
B-6	11.1	2967650	784503	21
B-7		NOT COND	UCTED	•
B-8		NOT COND	UCTED	
B-9	33	2967793	784505	31
B-10	12.3	2967794	784421	31
B-11	13.2	2967827	784416	21
B-12	29	2967867	784463	30
B-13	15.1	2967881	784366	21
B-14	17	2967936	784410	26
B-15	16.2	2967972	784383	26
B-16	15.7	2967979	784354	12
B-17	15.1	2968036	784367	24.5
B-17A	14.2	2968062	784314	21
B-18	11.2	2968175	784245	21
B-19	10.6	2968304	784189	12
B-20	9.9	2968420	784132	21
B-21	9.4	2968604	783939	12
B-22	12.6	2968763	783811	21
B-23	10	2968922	783601	21
B-24	9.8	2968991	783502	21
B-25	10.1	2969045	783434	21
B-26	10.8	2969182	783262	71
B-26A	10.8	2969240	783059	71
B-27	10.7	2969272	782923	12
B-28	10.5	2969288	782872	71
B-28A	10.7	2969308	782794	71
B-29	10.2	2969321	782715	71
B-30	10.2	2969338	782660	12
B-30A	9.8	2969359	782585	71
B-31	9.2	2969377	782517	71
B-31A	8.8	2969395	782450	71
B-32	8.2	2969416	782376	12
B-33	14.3	2969417	782241	81
B-34	9.2	2969456	782154	22
B-35	8.7	2969523	781962	22
B-36	8.7	2969500	781909	61

		COORD	INATES	
BORING	GROUND SURFACE ELEVATION (ft)	NORTHING	EASTING	BORING DEPTH (ft)
B-37	8.7	2969574	781741	12
B-38	8	2969659	781488	12
B-39	7.6	2969712	781275	22
B-40	7.4	2969793	780964	12
B-41	8.3	2969853	780749	22
B-42	10.8	2969849	780631	61
B-43	7.9	2969908	780502	9.1
B-44	8.1	2969940	780363	12
B-45	11.7	2969872	780340	21
B-46	7.6	2969960	780291	22
B-47	9.8	2969928	780259	109
B-48	7.9	2970007	780140	71
B-49	7.3	2970051	780153	71
B-50	7	2970073	780070	71
B-51	7.3	2970034	780048	71
B-52	6.9	2970105	779948	12
B-53	6.3	2970065	779889	12
B-54	7.1	2970092	779837	12
B-55	6	2970161	779739	12
B-56	11.9	2970084	779698	16
B-57	6.4	2970144	779641	17
B-58	6.4	2970160	779561	22
B-59	6	2970208	779567	12
B-60	6.4	2970193	779450	17

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TABLE 2 GROUNDWATER LEVEL MEASUREMENTS

	ェ		*									1
vater 3 (ft)	DEPTH	13.4	+0.3 *	2.0	4.6	3.0	7.8	3.8	3.6	3.2	5.4	
Groundwater Reading (ft)	DATE	5/21/2014	5/21/2014	1.4 5/21/2014	5/21/2014	5/21/2014	5/21/2014	3.2 5/21/2014	5/21/2014	5/21/2014	5.2 5/21/2014	
ater (ft)	DEPTH	13.0	+1.0 *	1.4	4.6	2.3	7.6		3.0	4.0	5.2	
Groundwater Reading (ft)	DATE	under ice+snow 2/22/2014 14.0 3/22/2014 13.8 4/22/2014 13.0	> 0 4/22/2014 +1.0 * 5/21/2014	4/22/2014	5.0 4/22/2014	4/22/2014	4/22/2014	4.2 4/22/2014	4/22/2014	4/22/2014	5.4 4/22/2014	
ater (ft)	DEPTH	13.8	> 0	1.0	5.0	2.2	8.0	4.2	4.1	4.0	5.4	
Groundwater Reading (ft)	DATE	3/22/2014	> 0 3/22/2014	0.7 3/22/2014	5.1 3/22/2014	under snow+ice 3/22/2014	3/22/2014	4.3 3/22/2014	4.0 3/22/2014	3.4 3/22/2014	4.8 3/22/2014	
ater (ft)	DEPTH	14.0	> 0	0.7	5.1	v+ice	8.8	4.3	4.0	3.4	4.8	
Groundwater Reading (ft)	DATE	2/22/2014	2/22/2014	2/22/2014	2/22/2014	under snov	2/22/2014	2/22/2014	2/22/2014	2/22/2014	4.2 2/22/2014	
ater (ft)	DEPTH	snow	> 0	5.2	5.5	snow	8.8	5.7	9.9	4.4	4.2	
Groundwater Reading (ft)	DATE		2/3/2014	2/3/2014	2/3/2014	moder ice+snow	2/3/2014	2/3/2014	2/10/2014	2/3/2014	2/3/2014	
ater (ft)	DEPTH	14.0	> 0	5.2	5.6	4.1					4.1	
Groundwater Reading (ft)	DATE	12/31/2013 14.0	12/31/2013	12/31/2013	12/31/2013	12/31/2013					12/31/2013 4.1	
iter ft)	DEPTH			5.2		5.3						
Groundwater Reading (ft)	DATE	12/2/2013 14.2		11/24/2013		11/29/2013						
er t)	DEPTH	13.9	> 0	6.9	5.4	7.8	8.7	5.6	5.8	4.4	5.6	
Initial Groundwater Reading (ft)	DATE	11/24/2013	12/3/2013	11/22/2013	11/29/2013	11/26/2013	1/23/2014	1/29/2014	2/7/2014	1/10/2014	12/30/2013	
Well Screen DEPTH	(II)	10 to 20	19 to 29	10 to 25	10 to 20	9 to 19	10 to 20	10 to 20	10 to 20	10 to 20	5 to 15	
ELEVATION Top of Roadbox	(iii)	8.4	12.3	17	6.6	10	10.8	8.6	8.7	8.3	6.7	
Installation Date		11/20/2013	12/2/2013	11/21/2013	11/26/2013	11/25/2013	1/21/2014	1/28/2014	2/3/2014	1/8/2014	12/26/2013	
	EASTING	784791	784421	784410	784132	783601	783262	782585	781962	780749	780140	
COORDINATES	NORTHING	2966945	2967794	2967936	2968420	2968922	2969182	2969359	2969523	2969853	2970007	
BORING No.		B-1	B-10	B-14	B-20	B-23	B-26	B-30A	B-35	B-41	B-48	NOTES.
BORI		B		00s			²⁻⁸	B-3(B-3	B-4	B-4	L

Boring B-10: artesian condition: temporary riser pipe added, <u>+ value</u> indicates water level <u>above</u> top of roadbox. Boring B-23: major surface runoff area, water infiltrating into the roadbox and affecting the water level readings.

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						Atterb	Atterberg Limits		Grain Size	ize					Cons	nsolidation		Modifie	Modified Proctor					o Hd	pH of Soil in
	Sample			Moisture	Organic	Plactic I is	Plac.	Placticity			UU Shear	Lab Vane Shear	Rock	Precon	Void	noression	Recompression	Maxim	Optimum		Resistivity	Chloride	Sulfate	•	
No.	Depth (ft)	No.		(%)	Content (%)	Limit Li (PL) (1	Limit Ind (LL) (P	Index Gravel, (PI)	el, % Sand, %	, % Fines, %	()	n Strength (tsf)	٥	<u>r</u>	Ratio (e _o)	Index (C _c)	Index (C,)	Density (corrected) (pcf)	Moisture Content (corrected)	CBR	(ohm-cm)	Content (mg/kg)	Content (mg/kg)	Distilled Water	Calcium Chloride
7	4 to 6	SPT-3	Moist, light olive brown sandy clay with gravel																		2,686	24	160	7.0	2.9
-	14 to 16 19 to 21	ST-5 N SPT-6 N	Moist, dark grayish brown silt Moist, very dark olive gray sandy silt	55 31		32 t	53 2	21 0	42	58	0.013				1.40	0.37	0:030								
B-2	20 to 22	SPT-5	Moist, dark olive gray clayey sand		2.2	du																			
B-3	0 to 4	Bulk	Moist, very dain gray sand with sin and ignavel	76	c			40) 52	80					\downarrow			135.0	6.0	45					
B-5	4 to 6	SPT-3	Moist, light yellowish brown clay		3.5	07	+	#	+	Ş			\prod							\parallel	2,066	93	QN	6.9	6.4
	12 to 14	SPT-6	Moist, olive gray clayey sand Moist, light olive brown clay with sand	10		13	21	10	1 45	46					1					#					
B-15	4 to 6	SPT-3	and gravel Moist, olive gray clay with sand	17		18	34	11	12	74											2,583	2	QV	6.7	7.2
B-18	19 to 21		Moist, greenish gray clayey sand with						<u> </u>																
B-21	0 to 10		graver Moist, very dark gray silty sand with gravel	2									_					134.0	u u	λς					
B-22	14 to 16	SPT-5	Moist, olive gray clay	27		25	50 2	25	H	$\frac{1}{1}$								2	2	3	1		9	ı	i i
B-24 B-26	2 to 4 1 to 4		Moist, olive brown clayey sand Moist, very dark gray sand with silt and				-													8	7,231	88	120	6.c	5.5
B-28	9 to 11		gravel Moist, brown sand with gravel			+		χ. 45.	26									134.0	6.5	37	10,527	QN	QN	0.9	6.5
B-28A	19 to 21		Moist, light olive brown sand with silt and gravel					4		2															
B-30	1 to 3	Bulk	Moist, black silty gravel with sand			H		47	7 37									117.0	9.5	113					
B-33	2 to 4	SPT-1	Dry, grayish brown silty sand with gravel																		11,363	Q.	ND	5.9	5.3
1	24 to 26	SPT-6	Moist, olive brown sandy silt			45	70	٥	37	63															
90	9 to 11	SPT-5	Moist, very dark gray cray Moist, olive brown clay	20 24		<u>c</u>	/7	7	+																
8-30	29 to 31	SPT-7	Moist, grayish brown sand with silt			H														Ħ					
0	39 to 41		Moist, light brownish gray clay Moist, dark grayish brown sand with silt	31		16	7 7 7	7.7.		-															
P-3/	1 to 5	Bulk	and gravel					40	0 49	1								120.5	8.5	39					
B-38	10 to 12	SPT-2	Molst, dark brown slity sand with organics	193	32.6			0	86	14															
B-39	1 to 5	Bulk	Moist, very dark grayish brown gravel with silt and sand					51	44	2								140.5	6.0	69					
B-41	1 to 5		Moist, very dark gray sand with silt and gravel					41	1 53	9								133.0	5.0	32					
	19 to 21	SPT-5	Moist, olive gray clay Moist, olive gray clay	34		\parallel	\parallel	+	+											#					
B-42	39 to 41	SPT-9	Moist, dark olive gray clay	38		23	50 2		\prod				\prod												
	49 to 51 59 to 61	ST-5 ST-6	Moist, dark olive gray clay Moist, olive gray clay	38		+	+	+	+	+					‡					‡					
B-44	6 to 8	SPT-1	Moist, yellowish-brown silty, clayey	44	4.7	44	34	32 24	64	<u>ر</u> م															
	14 to 16	SPT-4	Moist, olive clay	26																\parallel					
	19 to 21	SPT-5	Moist, olive clay Moist, greenish grav clay	34		21	48 2	27	+	-		0.25		9	1.07	0.28	0.047								
	34 to 36	OT-3	Moist, greenish gray clay	37		H	H	H	H		0:30	0.20		1.9	1.06	0.27	0.041			\parallel					
<u>}</u>	59 to 61	OT-7	Moist, greenish gray clay Moist, greenish gray clay	30		16	30	4	\prod	H	0.53	0.18	\prod	3.0	0.87	0.25	0.030								
	104 to 105	Run 1	See photos	8							t o	3	168 pcf 4 449 psi		t o	63:0									
B-48	1 to 5	Bulk	Moist, very dark gray gravel with silt					53	3	α								128.5	5.0	48					
	1 to 5	Bulk	Moist, very dark brown silty sand with gravel																	2	30,991	2	QN	5.0	4.2
	9 to 11 14 to 16	SPT-1 SPT-2	Wet, dark olive brown clay Moist, light brownish gray clay	108 34		23	49 2	56																	
00.0	19 to 21	OT-1	Moist, greenish gray clay	36		H	$oxed{+}$				0.56			3.5	1.00	0.32	0.028			Ħ					
. 1	39 to 41	SPT-6	Moist, glay clay			73	46 2	23	$\frac{ }{ }$		\prod				\parallel					\parallel					
B.51	54 to 56 29 to 31	SPI-9 OT-1	Moist, olive clay Moist, greenish gray clay			+	+	$\frac{1}{1}$	$\frac{1}{1}$	\downarrow	0.39			2.7	1.05	0.27	0.029			\ddagger					
B-52	64 to 66 6 to 8	OT-2 SPT-1	Moist, greenisgh gray clay with sand Wet, very dark brown sandy silt		7.8	32 (60 2	28 2	44	54	0.25			1.9	0.67	0.13	0.014								
B-53	6 to 8	SPT-1	Moist, very dark grayish brown silt with organics																		537	3700	2000	7.1	9.9
B-57	1 to 5	Bulk	Moist, very dark gray sand with slit and gravel	_]				39	9 51	10								132.0	6.5	33					
	10 to 12	SPT-2	SPT-2 Moist, very dark brown sandy organic	167	22.9	85 1	172 8	87 0	30	70															
Note: N	ND stands for		ected. NP stands for "Non Plastic".																						

ATTACHMENT 1

BORING LOGS



PROJE	CT: Mas	SDOT S	Silver Line E	xtension			SHE	EET	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256		1 o	f 2	B-1
	MBT	A Right	of Way		LOCATION:		Elevation	on: To	tal Depth:
		Chelsea	MA		N 2966956 E 78483	0	8.	4'	21.0
	CONTRAC	TOR :	Northern Dri	II Service	ENG: William Checchi		BEGUN		11/20/2013
DRILL		Мс	bile B-59 truck	(DRILLER: Wayne Tucker		FINISH		11/20/2013
Hole Siz			Weather:			Ground Wa	ater (Dep	oth/Elev.)	
	casing - 4	" ID			11/20/13 clear 35 F				ogs (2/22/14)
Drilling	Method :				Drilling Fluid :	Top of Roc			
	Rotary	wash wi	th Roller bit	Т	WATER		No	ot Encount	ered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS
			48-34		Dry, light brown GRAVEL and SAND, trace sil	t, very dense			
	SPT-1	68		15"	FILL		0.0	Hazmat san	nple
			34-26		Dry, light brown GRAVEL and SAND, trace sil	t, very dense	GP to SP		,
	SPT-2	61	23-26	4"				Hazmat san	nple
			35-19						
5_	SPT-3	20	4-10	6"	Moist, light brown to tan CLAY, little gravel, fe	w sand, very	CL		ntent 24 mg/kg tent 160 mg/kg
	361-3	20	10-10	0					2,686 ohm-cm stilled water)
			10 10					<i>p</i> (a.c	nator,
10	SPT-4	6	5-4	0	Moist, gray CLAY, few peat, medium stiff		CL	after SPT-4 to 11', 16" r	, 3" spoon pushed from 9' ecovery
	3F1-4	O	2-3	U					
			20						
15_	ST-5	-	Push tube	23"	Moist gray-brown SILT		MH	Moisture co Plastic limit plastic index	32, Liquid limit 53
20	SPT-6	8	4-2	21"	Moist, light olive SILT, little sand, medium stiff		ML	Moisture co	ntent 31%, nonplastic
	TYPES:	trac			SPT Resistance				Approve/Date
	SPLIT SPOO SPLIT SPOO			Cohesionles	s Density: 0-4 Very Loose Cohe	sive Consistency	/ ()-2 Ver	v Soft	
	LBY TUBE	son				4 Soft, 5-8 M/St	=)		
RUN=RO	OCK CORE	mos	stly >50%	30-49	Dense 50+ Very Dense 1	6-30 V-Stiff, 3	1+ Hard		



ROJE	CT: Ma	ssDOT S	Silver Line E	xtension					SHE	EET	BORING NO.
SITE L	OCATION:				JOI	3 NO.: 60242256			2 0	f 2	B-1
	MB ⁻	ΓΑ Right	of Way		LO	CATION:			Elevation	on:	Total Depth:
		Chelsea,				N 2966956	E 7	84830	8.	4'	21.0
Depth	Sample	N	Blow Count	Sample		SAMPLE			ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery		DESCRIPTION	NC		Class.		REWARRO
				(inches)							
	SPT-6	8	6-4	21"		Moist, light olive SILT, little sand, r	mediur	n stiff	ML	Moisture sand 41.	content 31%, nonplastic, 8%, fines 58.2%
						End of Boring @ 21.0' bgs					
_										PVC	Monitoring well set screen from 10' to 20' bgs,
25										be	entonite seal 6' to 8' bgs
_											
30											
_											
					_						
35											
40											
45											
AMPL	E TYPES:	trac	e 0 to 5%			SPT Res	istanc	e	•	•	Approve/Date
PT=2"	SPLIT SPO	ON few	5 to 10%								
	SPLIT SPO			Cohesionles				Cohesive Consistency	_	-	
	TERB. TUBE		e 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/S		Stiff	
JN=R	OCK CORE	mos	stly >50%	30-49	Dens	e 50+ Very Dense		16-30 V-Stiff, 3	1+ Hard		



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	EI	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 of	2	B-2
	MB	ΓΑ Right	of Way		LO	CATION:		Elevation	n: To	tal Depth:
	(Chelsea	MA			N 2966931 E 784728	}	10.	0'	27.0'
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	ΕN	G: William Checchi		BEGUN	l:	12/4/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DR	ILLER: Tim Tucker		FINISH	ED:	12/4/2013
Hole Si	ze:		Weather:		•		Ground Wa	ter (Dep	th/Elev.)	:
3	3.25" ID HA	S		1	12/4	/13 partly cloudy 43 F		7'	bgs (12/4	1/13)
Drilling	Method :				Dri	lling Fluid :	Top of Rocl	k (Depth):	
	Hol	low Sten	n Auger			none		No	t Encoun	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
				, ,		Dry, wood chips, dark brown to black SAND, litt silt	le gravel and	SM		
	SPT-1	12	3-5	4"		Dry, brown to black SAND, little gravel and silt, dense	medium	SM		
	0		7-5	'						
5						FILL				
	SPT-2	6	2-4	8"		Moist to Wet, gray brown medium to fine SAND few silt,clay, and peat, loose	, little gravel,	SP		DT 4%
			2-5						gravel in SF	•
									auger grind	ing thru gravels
						FILL				
10									auger grind	ing thru gravels
	SPT-3	6	1-3	16"	-	Moist, tan fine SAND, little clay, few gravel and	silt, loose	SC		
	3F1-3	0	3-2	10		Moist, black brown PEAT, little sand and silt, m	edium stiff	PT		
			02		_					
15										
	SPT-4	2	1-1	24"		Moist, dark gray SILT, some fine sand, trace or	ganics, loose	ML		
	0114		1-1	2-7						
20										
SAMPLE	TYPES:	trac	e 0 to 5%			SPT Resistance				Approve/Date
	SPLIT SPO					1				
	SPLIT SPO			Cohesionles			ve Consistency			
	LBY TUBE	son		5-9 Lo 30-49			Soft, 5-8 M/St 30 V-Stiff, 31		ufT	
			,			, = =::==				i .



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension	1				SHE	ET	BORING NO.
SITE L	OCATION:					B NO.: 60242256			2 of	f 2	B-2
	MB	ΓA Right	of Way		LO	CATION:			Elevation	on:	Total Depth:
	(Chelsea	, MA			N 2966931	E 7	84728	10.	.0'	27.0'
Depth	-	N	Blow Count	Sample			AMPLE		ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)			CRIPTION		Class.		
	SPT-5	4	1-2 2-1	24"		Moist, dark gray SILT, so shells, loose	me fine sand, tr	ace organics and	ML		e content 37%, c matter 2.2%, non-plastic
25_					-	West steel const CU T course	- E 4				
	SPT-6	0	woh/20" 1	24"		Wet, dark gray SILT, som	e fine sand, tra	ce organics, loose	ML		
30						End of Boring @ 27.0'					
_											
35											
40											
-											
<u>.</u>					1						
45 SAMPL	E TYPES:	troc	e 0 to 5%		<u> </u>	<u> </u>	PT Resistanc	-Δ	<u> </u>	<u> </u>	Approve/Date
	E TYPES: SPLIT SPO	trac ON few				51	i nesistano	, C			Approve/Date
	SPLIT SPOO			Cohesionles	ss De	ensity: 0-4 Very Loose		Cohesive Consistency	/ 0-2 Ver	y Soft	
	TERB. TUBE		ne 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/S	_		
RUN=R	OCK CORE	mos	stly >50%	30-49	Dens	se 50+ Very Dense		16-30 V-Stiff, 3			



PROJE	CT: Mas	ssDOT	Silver Line E	xtension			SHE	EET	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256		1 of	f 2	B-3
	MB	ΓA Righ	t of Way		LOCATION:		Elevation	on: To	tal Depth:
	(Chelsea	, MA		N 2967075 E 78475	2	9.	1'	27.0'
DRILL	CONTRAC	TOR:	Northern Dri	II Service	ENG: William Checchi		BEGUN	N:	12/4/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DRILLER: Tim Tucker		FINISH	IED :	12/4/2013
Hole S	ze:		Weather:			Ground Wa	ter (Dep	oth/Elev.):	
3	3.25" ID HA	S		1	2/4/13 partly cloudy 43 F		5'	bgs (12/4	/13)
Drilling	Method :				Drilling Fluid :	Top of Rock	k (Depth	n) :	
	Holl	ow Ster	n Auger		none		No	ot Encount	ered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS
	Bulk				Dry, brown SAND, some gravel, few silt			Auger spo	il as Bulk sample
	sample				FILL		GW to		
					Dry, brown to black GRAVEL and SAND, few	silt, loose	SW	gravel 39.79 fines 8.3%	%, sand 52%,
	SPT-1	6	3-3	12"	Moist, gray SAND, little silt, trace gravel, loose		SM		
			3-3		illioist, gray SAND, little siit, trace graver, loose	,	SIVI		
5									
			2.4		Wet, gray SAND, little silt, trace gravel, very lo	oose	SM		
	SPT-2	2	2-1	16"					
 -			1-1						
10					Wet, gray CLAY, trace sand and silt, soft				
	SPT-3	4	2-2	4"	Wet, gray CLAT, trace sand and siit, soit		CL		
	3 3		2-3						
15	- SPT-4	0	woh/24"	24"	Wet, gray CLAY, trace sand and silt, with shel	ls, very soft	CL	moisture co 3.2% organi Plastic limit Plastic inde.	cs 26, Liquid limit 50,
	ST-3	-	PUSH TUBE	0"	Wet, gray fine SAND and SILT, loose		SM to ML		oushed SPT 19' bgs, 24" recovery
20	SPT-5	1	woh/14"	24"	Wet, gray fine SAND and SILT, loose		SM to ML		
	E TYPES:	trac	e 0 to 5%	`	SPT Resistance		IVIL	I	Approve/Date
SPT=2"	SPLIT SPO	ON few	5 to 10%						
	SPLIT SPOO			Cohesionles		sive Consistency			
	ELBY TUBE		ne 30 to 45%			4 Soft, 5-8 M/St		Stiff	
KUN=K	OCK CORE	mo	stly >50%	30-49	Dense 50+ Very Dense 1	5-30 V-Stiff, 31	+ mard		



PRO	JECT: Ma	ssDOT S	Silver Line E	xtension					SHEET	BORING NO.
SITE	LOCATION:				JOB N	IO.: 6024225	6		2 of 2	B-3
	MB ⁻	TA Right	of Way		LOCAT				Elevation:	Total Depth:
		Chelsea,			N 2	2967075	E 7	84752	9.1'	27.0'
Dept		N	Blow Count	Sample			SAMPLE	<u> </u>	ASTM	- !
(ft)		Value	(per 6 in.)	Recovery (inches)			SCRIPTION		Class.	REMARKS
	SPT-5	1	1-1	24"	Wet	t, gray fine SAND an	d SILT, loose		SM to ML	
25_	SPT-6	1	1- 1/12"	24"	Wet	t, gray fine SAND ar	nd SILT, loose		SM to ML	
			1		End	of Boring @ 27.0' b	gs			
30_					-					
35_										
40_										
45]					
	LE TYPES:	trac	e 0 to 5%		<u> </u>		SPT Resistance	 ce	1	Approve/Date
	2" SPLIT SPO									/ ippiovo/Date
	B" SPLIT SPO			Cohesionles	ss Density	: 0-4 Very Loose		Cohesive Consistency	y 0-2 Very Sof	t
OT=O	STERB. TUBE	son	ne 30 to 45%			10-29 Med. Dense	•	3-4 Soft, 5-8 M/S		
RUN=	ROCK CORE	mos	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 3	1+ Hard	



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	EI	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 of	1	B-4
	MB	ΓΑ Right	of Way		LC	CATION:		Elevation	n: To	otal Depth:
	(Chelsea,	MA			N 2967307 E 78466	51	11.	.8	12.0'
DRILL	CONTRAC	TOR :	Northern Dr	ill Service	ΕN	IG: William Checchi		BEGUN	l:	12/4/2013
DRILL	RIG: A	TV Mobil	e B-48, Auto I	Hammer	DF	RILLER: Tim Tucker		FINISH	ED:	12/4/2013
Hole Siz	ze:		Weather:				Ground Wa	ater (Dep	th/Elev.)	:
3	.25" ID HA	S		1	12/4	/13 partly cloudy 43 F		6'	bgs (12/4	4/13)
Drilling	Method :				Dr	lling Fluid :	Top of Roc	k (Depth):	
	Hol	low Sten	n Auger	1		none		No	t Encoun	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
						asphalt pavement				
			4-7			FILL Dry, brown to black GRAVEL and SAND, little	silt	GM to SM		
	SPT-1	16	9-10	18"					wood fragn	nents
5										
						Moist, brown SAND, little gravel and silt, loose	•	SM		
	SPT-2	9	7-6	9"		Wet, olive gray CLAY, trace gravel, sand, and	silt, stiff	CL		
			3-4					02		
10						Wet, olive gray CLAY, trace gravel, sand, and	silt, medium	01		
			3-1			stiff Wet, dark brown PEAT, trace sand and silt, s		CL PT		
	SPT-3	3		14"						
			2-2			Wet, dark brown CLAY, trace sand, silt, peat,	soft	CH		
						End of Boring @ 12.0' bgs				
15										
'										
					1					
20	TYPES:	trac	e 0 to 5%	,		SPT Resistance				Approve/Date
	: TYPES: SPLIT SPO					SFT RESISIDITE				Approve/Date
	SPLIT SPO			Cohesionles	ss D	ensity: 0-4 Very Loose Cohe	sive Consistency	v 0-2 Ven	/ Soft	1
	LBY TUBE	som					-4 Soft, 5-8 M/S	-		
	OCK CORE			30-49			6-30 V-Stiff, 3			



B-5 Depth: 21.0		
·		
21.0		
11/20/2013		
11/20/2013		
11/20/2010		
3)		
6' bgs (11/20/13) oth):		
ed		
EMARKS		
'		
ı		
nt 93 mg/kg not detected		
66 ohm-cm ed water)		
empt 6' to 6.5' bgs,		
" bgs sing to 7.5' bgs		
sing to 7.5 bgs		
ole 7.5' to 21' bgs		
vash		
wasii		
nt 10%,		
Liquid limit 21		
nd 44.5%,		
drove 3" spoon to 21',		
Annua 15 :		
Approve/Date		
M/Stiff, 9-15 Stiff 31+ Hard		
= nt 600 ent L		



OCATION:				n					EET	BORING NO.
MBTA Right of Way					NO.: 60242256			2 0	f 2	B-5
MBT	ΓΑ Right	of Way		LOC	ATION:			Elevation	on:	Total Depth:
(Chelsea,	MA		١	2967509	E 7	'84568	10	.7'	21.0
Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)					ASTM Class.		REMARKS
SPT-7	116	56-38	0"	D	y, gray CLAY, some sand	l, few gravel,	trace silt, hard	CL	after SP	T-7, redrove 3" spoon to 21', very
				E	nd of Boring @ 21.0' bgs					
TYPES:	trac	e 0 to 5%			SPT	Resistanc	ce	•		Approve/Date
							-			_
								_		
									Stiff	
	Sample Type/No. SPT-7 TYPES: PLIT SPOGERB. TUBE	Sample N Type/No. Value SPT-7 116 SPT-7 116 TYPES: trac PLIT SPOON few BRB. TUBE som	TYPES: trace 0 to 5% PLIT SPOON PLIT SPOON ERB. TUBE (per 6 in.)	Sample N Blow Count (per 6 in.) Sample Recovery (inches) SPT-7 116 56-38 0" SPT-7 116 56-38 0" TYPES: trace 0 to 5% PLIT SPOON little 15 to 25% Cohesionles Some 30 to 45% 5-9 Lot Cohesionles Cohesionle	Sample N Value (per 6 in.) Recovery (inches) SPT-7 116 56-38 0"	Sample N Value (per 6 in.) Recovery (inches) SPT-7 116 56-38 0° Dry, gray CLAY, some sand per sample and per sample and per sample sample and per sample an	Sample Type/No. Value (per 6 in.) Recovery (inches) SPT-7 116 56-38 0" Dry, gray CLAY, some sand, few gravel, End of Boring @ 21.0' bgs End of Boring @ 21.0' bgs TYPES: trace 0 to 5% SPT Resistance PLIT SPOON few 5 to 10% PLIT SPOON few 5 to 10% SPD Resistance Cohesionless Density: 0-4 Very Loose Cohesionless Density	Sample	Sample N Blow Count Sample Recovery (inches) Dry, gray CLAY, some sand, few gravel, trace silt, hard CL	Sample N Blow Count Sample SAMPLE DESCRIPTION Class



PROJE	CI: Mas	SSDOT S	Silver Line E	xtension					SHE	EI	BORING NO.
SITE L	OCATION:				JC	B NO.: 60242256			1 of	2	B-6
	MB	ΓA Right	of Way		LC	CATION:			Elevation	n: To	otal Depth:
	(Chelsea	, MA			N 2967650 E 784	503		11.	1'	21.0
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	E١	IG: William Checchi			BEGUN	l:	11/27/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DF	RILLER: Tim Tucker			FINISH	ED :	11/27/2013
Hole Siz	ze:		Weather:				G	round Wa	ter (Dep	th/Elev.)	:
4"	ID HW cas	ing			11.	/27/13 light rain 58 F			2.6'	bgs (11/	27/13)
Drilling	Method :				Dr	illing Fluid :	T	op of Rocl	k (Depth):	
	1	Rotary w	<i>r</i> ash			water	Not E			t Encour	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION			ASTM Class.		REMARKS
						Dry, black GRAVEL and SAND, little silt			014		
						FILL			GM to SM		
	SPT-1	33	17-18	16"		Wet, gray CLAY, some sand, little gravel, fe	ew silt,	hard	CL		
	0	00	15-12								
5			8-8		-	Moist, gray CLAY, some sand, little gravel, f	few silt	t, very stiff	CL		
3	SPT-2	17		12"		TILL					
			9-15		-						
					-						
					-	Dry, gray CLAY, some sand, little gravel, fe	w silt, s	stiff	CL		
10	SPT-3	13	6-5	16"							
			8-13		-						
					-	TILL					
					-						
					_	Moist, gray CLAY, some sand, little gravel, f	few eile	Very etiff	CL		
15	SPT-4	24	10-10	18"		invoist, gray OLAT, some sand, integraves, i	iew siii	i, very suii	OL		
			14-22								
					-						
					_						
					_						
					_				0:		
20	SPT-5	25	11-13	18"		Moist, gray CLAY, some sand, little gravel, f	few silt	t, very stiff	CL		
SAMPLE	TYPES:	trac	e 0 to 5%			SPT Resistance					Approve/Date
	SPLIT SPO					T					_
	SPLIT SPOC LBY TUBE			Cohesionles				Consistency			
	OCK CORE	son		5-9 Lo 30-49				oft, 5-8 M/St V-Stiff, 31		uil	



PROJE	CT: Mas	ssDOT	Silver Line E	xtension					SHE	ET	BORING NO.
SITE I	OCATION:				JOB NO.:	60242256			2 of	2	B-6
	MB	ΓΑ Righ	t of Way		LOCATIO				Elevatio	n: To	tal Depth:
	(Chelsea	, MA		N 296	7650	E 7	84503	11.	1'	21.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)			MPLE CRIPTION		ASTM Class.		REMARKS
	SPT-5	25	12-19	18"	Moist, g	ray CLAY, some s	and, little grave	el, few silt, medium	CL		
25					End of I	Boring @ 21.0' bgs	,				
_											
30											
35											
40											
-											
45		<u> </u>									· -
	E TYPES:	trac				SF	PT Resistance	e			Approve/Date
	SPLIT SPO			Cohesionles	ss Density	0-4 Very Loose		Cohesive Consistency	/ 0-2 Verv	Soft	
	TERB. TUBE	l l	ne 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/S	-		
	OCK CORE	l l			Dense	50+ Very Dense		16-30 V-Stiff, 3			



PROJE	CI: Mas	SSDOT S	Silver Line E	xtension	sion				SHE	EI	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256			1 of	2	B-9
	MB	ΓA Right	of Way		LO	CATION:			Elevation	n: To	tal Depth:
	(Chelsea	, MA			N 2967793 E 784	505		33.	0'	31.0'
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	ΕN	IG: William Checchi			BEGUN	l:	12/3/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DF	RILLER: Tim Tucker			FINISH	ED:	12/3/2013
Hole Siz	ze:		Weather:					Ground Wa	ter (Dep	th/Elev.)	
HW	casing - 4	" ID		1	12/3	/13 partly cloudy 45 F				Not evide	nt
Drilling	Method :				Dri	lling Fluid :		Top of Rocl	k (Depth):	
	Rotary	wash wi	th Roller Bit			Water			No	t Encoun	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery		SAMPLE DESCRIPTION			ASTM Class.		REMARKS
				(inches)		grass Maiet brown Tangail					
	- SPT-1	52	15-24 28-38	24"		grass, Moist, brown Topsoil Dry, brown SAND, some gravel, little silt, ve	ery de	ense	SM		
5			22-25			Dry, brown-gray SAND, little gravel and clay dense	y, few	silt, very	SC		
	SPT-2	63		24"		uerise					
			38-31		_	TILL					
10	SPT-3	62	22-62/3"	6"		Moist, gray GRAVEL and SAND, little clay, i	few s	ilt, dense	SC		icing at 9.8' bgs, els or cobble
15	SPT-4	38	13-17	22"	- - -	Dry, gray SAND, little gravel and clay, few	silt, d	lense	SC		
					- -	TILL					
20	SPT-5	44	15-20	16"		Moist, olive SAND, little gravel and clay, few	w silt,	dense	SC		
	TYPES:	trac				SPT Resistance					Approve/Date
	SPLIT SPOO SPLIT SPOO			Cohesionles	00 0	ongity: 0.4 Vany Loops	ahosi:	o Consisten	0.01/5-	, Coff	
	SPLIT SPOC LBY TUBE	ON little son						e Consistency Soft, 5-8 M/St			
	OCK CORE	mos		30-49				30 V-Stiff, 31			



PROJI	ECT: Mas	ssDOT S	Silver Line E	xtension		SHEET	BORING NO.
SITE	LOCATION:				JOB NO.: 60242256	2 of 2	B-9
	MB	ΓA Right	of Way		LOCATION:	Elevation:	Total Depth:
	(Chelsea	, MA		N 2967793 E 784505	33.0'	31.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION	ASTM Class.	REMARKS
	SPT-5	44	24-32	16"	Dry, olive SAND, little gravel and clay, few silt, dense	SC	
25	SPT-6	36	13-17 19-24	20"	Moist, olive SAND, little gravel and clay, few silt, dense	SC	
30	SPT-7	32	14-15 17-26	20"	Moist, olive SAND, little gravel and clay, few silt, dense	SC	
35_					End of Boring @ 31.0' bgs		
-							
40							
45 SAMPL	E TYPES:	trac	ee 0 to 5%		SPT Resistance		Approve/Date
	' SPLIT SPO				C. 1 (VOIOLATIO		7.0010101010
	SPLIT SPOO		15 to 25% ne 30 to 45%	Cohesionles			
	OCK CORE			30-49			



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	EI	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 of	2	B-10
	MB	ΓΑ Right	of Way		LO	CATION:		Elevation	n: To	otal Depth:
	(Chelsea	, MA			N 2967794 E 7844	21	12.	3'	31.0'
DRILL	CONTRAC	TOR:	Northern Dri	II Service	ΕN	G: William Checchi		BEGUN	l:	12/2/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DR	ILLER: Tim Tucker		FINISH	ED :	12/2/2013
Hole Siz	ze:		Weather:				Ground Wa	ter (Dep	th/Elev.)	:
HW	casing - 4	" ID			1	2/2/13 cloudy 38 F	Arte	esian [ab	ove road	box] (2/22/14)
Drilling	Method :				Dri	lling Fluid :	Top of Roc	k (Depth):	
	Rotary	wash wi	th Roller Bit			Water		No	t Encoun	tered
							u.			
Depth	Sample	N	Blow Count	Sample		SAMPLE		ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)		DESCRIPTION		Class.		
				,		Moist, brown Topsoil, grass				
						FILL Moist, olive GRAVEL and SAND, little silt		GM to		
								SM		
	SPT-1	16	4-7	14"		Moist, black GRAVEL and SAND, little silt, me	eaium aense			
	3P1-1	16	9-7	14						
						Moist, olive CLAY, some sand, little gravel, fe	w silt, very stiff	CL		
5	SPT-2	17	10-8	12"				OL		
			9-12							
						TILL				
						Mariat aliva CLAV appropriate little approach for	لدوما خالد			
10	SPT-3	33	13-13	18"		Moist, olive CLAY, some sand, little gravel, fe	w siit, nard	CL		
	351-3	33	20-25	10						
			20-23							
45			10-15			Moist, olive CLAY, some sand, little gravel, fe	w silt, hard	CL		
15	SPT-4	35		10"						
			20-22							
						TILL				
20	SPT-5	39	14-19	8"		Moist, olive CLAY, some sand, little gravel, fe	w silt, hard	CL		
	TYPES:	trac				SPT Resistance				Approve/Date
	SPLIT SPO								0.6	-
	SPLIT SPOO LBY TUBE	ON little son		Cohesionles 5-9 Lo			esive Consistency 3-4 Soft, 5-8 M/St	•		
	OCK CORE			30-49			16-30 V-Stiff, 3		uit	



PROJ	IECT: Ma:	ssDOT S	Silver Line E	xtension				SHEET	BORING NO.
SITE	LOCATION:					3 NO.: 60242256		2 of 2	B-10
	MB ⁻	TA Right	of Way		LO	CATION:		Elevation:	Total Depth:
		Chelsea,	-			N 2967794	E 784421	12.3'	31.0'
Dept (ft)		N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION	N	ASTM Class.	REMARKS
	SPT-5	39	20-20	8"	-	Moist, olive CLAY, some sand, little	gravel, few silt, hard	CL	
						TILL			
25_	SPT-6	60	13-19 41-27	18"		Moist, olive CLAY, some sand, little	gravel, few silt, hard	CL	
					- - -				
30_	SPT-7	31	11-14 17-19	2"		Moist, olive CLAY, some sand, little	gravel, few silt, hard	CL	
					-	End of Boring @ 31.0' bgs			PVC well set : screen from 19 to 29' bgs, bentonite seal 15' to 17' bgs
35_					-				
40					-				
					-				
45					-				
	LE TYPES:	trac	e 0 to 5%			SPT Resis	stance		Approve/Date
SPT=2	2" SPLIT SPO	ON few	5 to 10%						
OT=O	S" SPLIT SPOO	som	ne 30 to 45%		oose	10-29 Med. Dense	Cohesive Consisten 3-4 Soft, 5-8 M/	Stiff, 9-15 Stiff	oft
RUN=	ROCK CORE	mos	stly >50%	30-49	Dens	e 50+ Very Dense	16-30 V-Stiff,	31+ Hard	



PROJE	CT: Mas	ssDOT \$	Silver Line E	xtension			SHE	ET	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256		1 of	f 2	B-11
	MB	ΓA Right	of Way		LOCATION:		Elevation	on: To	otal Depth:
	(Chelsea	, MA		N 2967827 E 7844	16	13.	.2'	21.0'
DRILL	CONTRAC	TOR:	Northern Dri	I Service	ENG: William Checchi		BEGUN	N:	11/27/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto I	lammer	DRILLER: Tim Tucker		FINISH	IED :	11/27/2013
Hole Siz	ze:		Weather:			Ground Wa	ter (Dep	oth/Elev.)	:
HW	casing - 4	" ID			11/27/13 rain 61 F				
Drilling I	Method :				Drilling Fluid :	Top of Roc	k (Depth	n) :	
	Rotary	wash wit	th Roller Bit		Water		No	ot Encoun	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS
					Moist, brown GRAVEL and SAND, little silt		GM to		
					FILL		SM		
							SM		
	SPT-1	11	4-5	6"	Dry, black SAND, some gravel, little silt, med	lium dense	Oivi		
	0		6-14	Ü	Dry, brown SAND, some gravel, little silt, med	dium dense	SM		
_			11-9				ff CL		
5	SPT-2	19	11-9	12"	Dry, olive CLAY, some sand, little gravel, few	siit, very stiir	CL		
			10-14		TILL				
10	SPT-3	37	11-17	22"	Dry, olive CLAY, some sand, little gravel, few	v silt, hard	CL	drilled cobb	oles and gravels 8.5' to 9.5'
15	SPT-4	38	9-15 23-66	16"	Dry, olive CLAY, some sand, little gravel, few	v silt, hard	CL		
20	SPT-5	43	12-20 te 0 to 5%	15"	Dry, gray CLAY, some sand, little gravel, few SPT Resistance	silt, hard	CL		Approve/Date
	SPLIT SPO				Of 1 Resistance				/ ipprovo/Date
	SPLIT SPO			Cohesionles	ss Density: 0-4 Very Loose Coh	esive Consistency	0-2 Ver	y Soft	1
	LBY TUBE	son		5-9 Lo	pose 10-29 Med. Dense	3-4 Soft, 5-8 M/St	tiff, 9-15 S	Stiff	
RUN=ROCK CORE mostly >50% 30-4					Dense 50+ Very Dense 16-30 V-Stiff, 31+ Hard				



PROJ	ECT: Ma	ssDOT \$	Silver Line E	xtension					SHEET	BORING NO.
SITE	LOCATION:				JOB N	O.: 6024225	56		2 of 2	B-11
	MB ⁻	TA Right	t of Way		LOCAT				Elevation:	Total Depth:
	1	Chelsea	, MA		N 2	967827	E 7	' 84416	13.2'	21.0'
Depti	h Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)			SAMPLE SCRIPTION		ASTM Class.	REMARKS
	SPT-5	43	23-27	15"	Dry,	gray CLAY, some	sand, little gravel	, few silt, hard	CL	
					End	of Boring @ 21.0' l	ogs			
25										
30										
35					-					
40										
45										
	LE TYPES:	trac	ce 0 to 5%		 		SPT Resistand	ce	+ +	Approve/Date
	" SPLIT SPO							1		
	" SPLIT SPO			Cohesionles	-			Cohesive Consistence		t
	STERB. TUBE		ne 30 to 45%			10-29 Med. Dens	se	3-4 Soft, 5-8 M/S		
KUN=l	ROCK CORE	mo	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 3	31+ Hard	



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension						:E1	BORING NO.
SITE L	OCATION:			JOB NO.: 60242256					1 of	2	B-12
	MB	ΓΑ Right	of Way		LO	CATION:			Elevation	n: To	otal Depth:
	(Chelsea	, MA			N 2967867 E 784	4463		29.	0'	30.0'
DRILL	CONTRAC	TOR:	Northern Dri	II Service	ΕN	IG: William Checchi			BEGUN	l:	12/3/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DF	RILLER: Tim Tucker			FINISH	ED :	12/3/2013
Hole Siz	ze:		Weather:		,			Ground Wa	ter (Dep	th/Elev.)	:
HW	casing - 4	" ID			1	2/3/13 cloudy 40 F				Not Evide	ent
Drilling	Method :				Dri	lling Fluid :		Top of Roc	k (Depth):	
	Rotary	wash wi	th Roller Bit			Water			No	t Encoun	tered
_											
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery		SAMPLE DESCRIPTION			ASTM Class.		REMARKS
(11)	Type/No.	value	(per o iri.)	(inches)		DESCRIPTION			Class.		
						Moist, brown topsoil and grass Moist, brown SAND, little gravel and silt, co	oncre	te chips	SM		
						Dry, brown SAND, little gravel and silt, den	nse		SM		
	SPT-1	40	12-21	6"							
			19-15								
5	SPT-2	19	17-15	18"		Dry, brown SAND, little gravel and clay, feddense	w silt,	medium	SC		
	3F1-2	19	19-21	10							
			10 21								
										drilled cobb	le and gravels
10			14-15			Moist, gray brown SAND, little clay, few gradense	avel a	and silt,	SC	Casing to 9	.0' bgs topen hole to
	SPT-3	41	00.40	14"						28.0' bgs	open note to
			26-18								
					_						
						TILL					
15			12-18		-	Moist, olive SAND, little clay, fewgravel and	d silt	, dense	SC		
15	SPT-4	41	23-24	6"							
			23-24		_						
	SPT-5	40	15-19	16"		Moiet alive SAND little alove fow ground on	مط مناب	donec	80		
20		<u> </u>		10		Moist, olive SAND, little clay, few gravel ar		, uense	SC		A
	TYPES: SPLIT SPO	trac ON few				SPT Resistance	!				Approve/Date
	SPLIT SPO			Cohesionles	ss De	ensity: 0-4 Very Loose C	Cohesi	ve Consistency	0-2 Ven	y Soft	1
	LBY TUBE	son						Soft, 5-8 M/St	•		
RUN=RO	OCK CORE	mo	stly >50%	30-49	Dense 50+ Very Dense 16-30 V-Stiff, 3						



PROJ	ECT: Ma	ssDOT S	Silver Line E	xtension				SHE	ET	BORING NO.
SITE	LOCATION:				JOE	3 NO.: 60242256		2 of	2	B-12
	MB	TA Right	of Way		LO	CATION:		Elevation	n: Tot	al Depth:
	(Chelsea	, MA			N 2967867 E 784	4463	29.0)'	30.0'
Dept (ft)	h Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
	SPT-5	40	21-23	16"	-	Moist, olive SAND, little clay, few gravel ar	nd silt, dense	SC		
25	SPT	-	50/0"	0	-	TILL				
_	SPT-6	66	10-33	19"		Moist, olive SAND, little clay, few gravel ar	nd silt, very dense	SC		
30_	SPT-7	122	33-38 63-92 30-41	10"		Moist, olive SAND, little clay, few gravel ar	nd silt, very dense	sc		
					-	End of Boring @ 30.0' bgs				
35_					-					
40_					- - -					
45										
SAMP	 LE_TYPES: 2" SPLIT SPO	trac ON few				SPT Resistance				Approve/Date
	" SPLIT SPOO STERB. TUBE			Cohesionles 5-9 Lo		nsity: 0-4 Very Loose C 10-29 Med. Dense	3-4 Soft, 5-8 M/St	-		
RUN=	ROCK CORE	mos	stly >50%	30-49	Dens	e 50+ Very Dense	16-30 V-Stiff, 31	1+ Hard		



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	EI	BORING NO.		
SITE LOCATION: JOB NO.: 60242256 MBTA Right of Way LOCATION:									2	B-13		
	MB	ΓΑ Right	of Way		LO	CATION:		Elevation	n: To	tal Depth:		
	(Chelsea	, MA			N 2967881 E 7843	66	15.1'		21.0'		
DRILL	CONTRAC	TOR :	Northern Dri	II Service	ΕN	ENG: William Checchi			l:	12/2/2013		
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DRILLER: Tim Tucker			FINISHED:		12/2/2013		
Hole Size : Ground Water (Depth/Elev									th/Elev.)	:		
HW	casing - 4	" ID				12/2/13 cloudy 40 F			5.0' bgs during drilling			
Drilling	Method :				Dri	illing Fluid : Top of Rock (Depth			h):			
	Rotary	wash wi	th Roller Bit		Water			Not Encountered				
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS		
						Moist, tan gravelly, silty SAND		SM				
	SPT-1 9 <u>5-4</u> 3"				Dry, black gravelly, silty SAND, loose FILL							
5	SPT-2	10	4-3	4"		Dry, black gravelly, silty, SAND, medium dens	se					
			7-11						gray wash			
					-							
						TILL						
10	SPT-3	47	14-24	5"		Moist, olive CLAY, some sand, little gravel, fe	ew silt, hard	CL	_	_		
			23-30		_							
_												
45		Moist, olive CLAY, some sand, little gravel, few silt, hard CL Casing to 9.0' bgs Roller bit open hole from 9' to 19' bgs 13-30 Moist, olive CLAY, some sand, little gravel, few silt, hard CL Casing to 9.0' bgs Roller bit open hole from 9' to 19' bgs										
15	SPT-4	60	30-28	10"								
			00 20			TILL						
20	SPT-5	36	10-17	16"		Moist, olive CLAY, some sand, little gravel, fe	ew silt, hard	CL				
	TYPES:	trac	e 0 to 5%			SPT Resistance				Approve/Date		
	SPLIT SPO					·						
	SPLIT SPO	ON little		Cohesionles			esive Consistency	0-2 Very	y Soft			
	LBY TUBE	son					3-4 Soft, 5-8 M/S		tiff			
RUN=RO	UN=ROCK CORE mostly >50% 30-49 Dense 50+ Very Dense 16-30 V-Stiff, 31+ Hard											



		MVCI EIIIC E	xtension					SHEET	BORING NO.	
CATION:				JOB NO.: 60242256			2 of 2	B-13		
MBT	A Right	of Way		LOCATION:			Elevation:	Total Depth:		
С	helsea,	MA		N 2967881 E 784366			15.1'	21.0'		
Sample ype/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)					ASTM Class.	REMARKS	
SPT-5	36	19-20	16"	Mois	t, olive CLAY, some	sand, little grav	el, few silt, hard	CL		
				End	of Boring @ 21.0' b	gs				
SAMPLE TYPES: trace 0 to 5%					SPT Resistance			· · · · · · · · · · · · · · · · · · ·	Approve/Date	
SPT=2" SPLIT SPOON few 5 to 10%							1			
				0-4 Very Loose				ft		
	Sample ype/No. SPT-5 YPES: LIT SPOO	Chelsea, Sample N ype/No. Value SPT-5 36 SPT-5 36 YPES: trac LIT SPOON few RB. TUBE som	ype/No. Value (per 6 in.) SPT-5 36 19-20 Image: specific control of the control of	Chelsea, MA Sample N Blow Count Sample Recovery (inches) SPT-5 36 19-20 16" SPT-6 36 19-20 16" SPT-7 16	Chelsea, MA Sample N Blow Count (per 6 in.) SPT-5 36 19-20 16" Moist End of Percentage of the state of	MBTA Right of Way Chelsea, MA Sample N Blow Count Sample N Pype/No. Value (per 6 in.) Recovery (inches) SPT-5 Recovery (inches) End of Boring @ 21.0' by End of Boring @ 21.0' by TSPOON LIT SPOON BLT SPOON BLT SPOON Ittle 15 to 25% Some 30 to 45% Some 30 to	MBTA Right of Way Chelsea, MA	Cocation: N 2967881 E 784366 Sample Oracle Oracle	MBTA Right of Way Chelsea, MA	



PROJECT : MassDOT Silver Line Extension								ET	BORING NO.		
SITE LOCATION: JOB NO.: 60242256								f 2	B-14		
	MB ⁻	ΓA Right	of Way		LOCATION:			on: To	tal Depth:		
	(Chelsea	, MA		N 2967936 E 784410			.0'	26.0		
DRILL	CONTRAC	TOR :	Northern Dri	II Service	ENG: William Checchi			N:	11/21/2013		
DRILL	RIG :	Мо	bile B-59 truck	(DRILLER: Wayne Tucker			ED:	11/22/2013		
Hole Si	ze:		Weather:		Ground Wa			ater (Depth/Elev.)			
HW	/ casing - 4	" ID		11/21/13	3 cloudy 48 F, 11/22/13 rain 45 F			5.2' bgs (11/24/13)			
Drilling Method :					Drilling Fluid : Top of Rock			` ' '			
	Rotary	wash wi	th Roller bit		WATER			Not Encountered			
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS		
					grass, topsoil and roots, Dry, light brown grave	elly, silty	GC to				
					Dry, brown gray GRAVEL and SAND, little cla	SC					
	- SPT-1	30	4-18	3"	Moist, brown gray SAND, some gravel, little cl dense	ay and silt,	SC				
			12-7		TILL						
5	SPT-2	15	24-9	4"	Wet, brown gray SAND, some gravel, little clay and silt, medium dense						
			6-3								
10	CDT 2		4-4		Wet, olive SAND, some clay, little gravel, few tip, loose	silt, wood in	sc	repush SP1	-3, recovered 5"		
	SPT-3	8	4-5	0							
					TILL						
15	SPT-4	46	7-19 27-23	0	[strips of wood recovered in spoon]				, pushed 3" spoon from 14' e wood strips recovered		
	SPT-4A	-	push 3" spoon	16"	Wet, olive CLAY, some sand, little gravel, few vertical strips of wood	silt, and	CL				
	SPT-5 53 14-25 0			0	Wet, olive CLAY, some sand, little gravel, few silt, vertical strips of wood, hard				, pushed 3" spoon ecovered 24"		
SAMPLE	SAMPLE TYPES: trace 0 to 5%				SPT Resistance			,	Approve/Date		
SPT=2"	SPLIT SPO	ON few									
	SPLIT SPO			Cohesionles							
	LBY TUBE	son						Stiff			
NON=K	RUN=ROCK CORE mostly >50% 30-49 Dense 50+ Very Dense 16-30 V-Stiff, 31+ Hard										



PRO	JEC	CT: Mas	sDOT S	Silver Line E	xtension				SHE	ET	BORING NO.
SITE LOCATION:							JOB NO.: 60242256			f 2	B-14
MBTA Right of Way						LOCATION:			Elevation:		Total Depth:
Chelsea, MA						N 2967936 E 784410			17.0'		26.0
		Ī	71101000,				14 2501000			<u> </u>	20.0
Dept	th	Sample	N	Blow Count	Sample		SAMPLE		ASTM		DEMARKO
(ft)		Type/No.	Value	(per 6 in.)	Recovery		DESCRIPTION		Class.		REMARKS
(11)		1) 0/110.	valuo	(por 0 iii.)	(inches)		BEGGIIII MGII		Olaco.		
		SPT-5	53	28-36	0		Wet, olive CLAY, some sand, little gravel,	, few silt, vertical	CL		PT-5, pushed 3" spoon
		01 1 0	00	20 00			strips of wood, hard			19' to 2	1', recovery 24"
							TILL				
	H						TILL				
							Mariet ali a OLAV anna anna l'Itala arra	d formally band	01		
25		0.D.T. 7	0.5	16-30			Moist, olive CLAY, some sand, little grave	el, few silt, hard	CL		
_		SPT-7	65		5"						
	H			35-52							
							End of Boring @ 26' bgs				
											PVC well set :
	Ħ										creen from 10' to 25' bgs, ntonite seal from 4' to 6' bgs
	\vdash					-					
30											
	H										
	Ħ										
	\vdash										
35											
	H										
	\forall					1					
40_	Ц										
	Ħ										
	dash					-					
	\forall										
45	Ш										
		TYPES:	trac				SPT Resistance	е			Approve/Date
		SPLIT SPOC									
		PLIT SPOO			Cohesionles		•	Cohesive Consistency	_	-	
			ne 30 to 45%			10-29 Med. Dense	3-4 Soft, 5-8 M/S		Stiff		
RUN=ROCK CORE		mos	stly >50%	30-49	uens	se 50+ Very Dense	16-30 V-Stiff, 3	ı+ Hard			



PROJE	CT: Ma	ssDOT S	Silver Line E	xtension			SHE	EET	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256		1 o	f 2	B-15
	MB	ΓΑ Right	of Way		LOCATION:		Elevation	on: To	tal Depth:
	(Chelsea,	MA		N 2967972 E 78	34383	16	.2'	26.0
DRILL	CONTRAC	TOR:	Northern Dri	Il Service	ENG: William Checchi		BEGUN	N:	11/21/2013
DRILL	RIG:	Мо	bile B-59 truck		DRILLER: Wayne Tucker		FINISH	IED :	11/21/2013
Hole S	ze:		Weather:			Ground W	ater (Dep	oth/Elev.):	
HV	V casing - 4	" ID			11/21/13 cloudy 46 F		No	ot Encount	ered
Drilling	Method:				Drilling Fluid :	Top of Roo	ck (Depth	n) :	
	Rotary	wash wi	th Roller bit		WATER		No	ot Encount	ered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS
	SPT-1	122	18-83	13"	Dry, light brown GRAVEL and SAND, little	e silt, very dense		topsoil, gra	ass and roots
		· - 	39-37		Dry, light brown GRAVEL and SAND, little	e silt, very dense	GM to SM	Hazmat san	nple
	SPT-2	103	68-48	8"		, ,		Hazmat san	nple
			55-54		Moist, gray CLAY, little sand, few gravel a	nd silt, hard	CL	-	
5	SPT-3	81	40-39	15"				no Chloride	or Sulfate detected
			42-87						2,583 ohm-cm
					TILL			roller bit ope	en hole 4' to 24' bgs
-									
10_	SPT-4	117	29-53	19"	Moist, gray CLAY, little sand, few gravel a	nd silt, hard	CL		
			64-70						
15_	SPT-5	70	15-27	24"	Moist, gray CLAY, little sand, few gravel a	nd silt, hard	CL		
	OI 1 3	70	43-55	24					
					TILL				
								roller bit thru	ı gravels or cobble
	SPT-6	120	120/5"	5"	Moist, gray CLAY, little sand, few gravel a	nd silt, hard	CL		
SAMPL	E TYPES:	trac	e 0 to 5%		SPT Resistance		<u> </u>	<u> </u>	Approve/Date
	SPLIT SPO								.,
	SPLIT SPO	ON little				Cohesive Consistenc	_	-	
	ELBY TUBE	som				3-4 Soft, 5-8 M/S		Stiff	
KUN=K	OCK CORE	mos	stly >50%	30-49	Dense 50+ Very Dense	16-30 V-Stiff, 3	ı+ Hard		



PROJ	ECT: Mas	ssDOT S	Silver Line E	xtension					SHE	ET	BORING NO.
SITE	LOCATION:				JOB	NO.: 60242256			2 of	2	B-15
	MB	ΓA Right	of Way		LOC	ATION:			Elevation	on:	Total Depth:
		Chelsea			N	2967972	E 7	84383	16	.2'	26.0
Dept		N	Blow Count	Sample		SAMP			ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)		DESCRIP	TION		Class.		
					_					roller bit	open hole to 24' bgs
					-	ТІІ	L				
25_	SPT-7	96	24-45	4"	Di	y, gray CLAY, little sand, fev	gravel ar	nd silt, hard	CL		
	Ji 1-7	50	51-60	7							
					Eı	nd of Boring @ 26' bgs					
					-						
30					1						
30_											
					_						
35_					1						
					1						
40_											
	1				1						
					-						
45					1						
	LE TYPES:	trac	e 0 to 5%			SPT F	Resistanc	e		<u> </u>	Approve/Date
	" SPLIT SPO										
	" SPLIT SPO			Cohesionles	ss Dens	· · · · · · · · · · · · · · · · · · ·		Cohesive Consistency	<u>y</u> 0-2 Ver	y Soft	
	STERB. TUBE		ne 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/S		Stiff	
RUN=	ROCK CORE	mos	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 3	1+ Hard		



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	EI	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 of	1	B-16
	MB	ΓΑ Right	of Way		LO	CATION:		Elevation	n: To	otal Depth:
	(Chelsea	, MA			N 2967979 E 7843	54	15.	7'	12.0
DRILL	CONTRAC	TOR:	Northern Dri	Il Service	ΕN	G: William Checchi		BEGUN	l:	11/22/2013
DRILL	RIG :	М	obile B59 truck		DF	ILLER: Tim Tucker		FINISH	ED:	11/22/2013
Hole Siz	ze:		Weather:				Ground Wa	ater (Dep	th/Elev.)	:
HV	V casing - 4"	'ID				11/22/13 rain 45 F		5'	bgs (11/2	2/13)
Drilling	Method :				Dri	lling Fluid :	Top of Roc	k (Depth):	
	Rotary	wash wi	th Roller Bit			Water		No	t Encoun	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
						grass and roots, tan GRAVEL and SAND, littl FILL	e silt	GM to SM		
	SPT-1	-	100/1" 300# 10-20	3"	ļ.	Moist, tan to gray GRAVEL and SAND, little overy dense	clay and silt,	GC to SC		
5	SPT-2	13	300# 12-11 9-7	4"		Wet, gray-brown GRAVEL and SAND, little countries brick fragments, medium dense	-	SC		
			6-8			Wet, olive CLAY, some sand, little gravel, fev	v silt, stiff	CL		
10						TILL				
	SPT-3	30	15-15	14"		Dry, olive CLAY, some sand, little gravel, few	silt, very stiff	CL		
			15-25							
_						End of Boring @ 12.0' bgs				
15										
SAMPLE	TYPES:	trac	e 0 to 5%	,		SPT Resistance				Approve/Date
	SPLIT SPO									.,
SS3=3"	SPLIT SPO	ON little	e 15 to 25%	Cohesionles	s De	ensity: 0-4 Very Loose Coh	esive Consistency	0-2 Ver	/ Soft	
	LBY TUBE	son	ne 30 to 45%	5-9 Lo	ose	10-29 Med. Dense	3-4 Soft, 5-8 M/S	tiff, 9-15 S	tiff	
RUN=R0	OCK CORE	mo	stly >50%	30-49	Den	se 50+ Very Dense	16-30 V-Stiff, 3	1+ Hard		



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension	1		SHE	ET	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256		1 0	f 2	B-17
	MB	TA Right	of Way		LOCATION:		Elevation	on: To	otal Depth:
		Chelsea,	-		N 2968036 E 784	367	15	.1'	24.5'
DRILL	CONTRAC	TOR:	Northern Dri	Il Service	ENG: William Checchi		BEGUN	N:	11/21/2013
DRILL	RIG:	Мо	bile B-59 truck	(DRILLER: Wayne Tucker		FINISH	IED :	11/21/2013
Hole S	ize :		Weather:		,	Ground Wa	ater (Dep	oth/Elev.)	:
HV	V casing - 4	" ID			11/21/13 cloudy 46 F			Not detec	ted
Drilling	Method :				Drilling Fluid :	Top of Roc	k (Depth	n) :	
	Rotary	wash wit	h Roller bit		WATER		No	ot Encoun	tered
Depth	-	N Value	Blow Count	Sample	SAMPLE		ASTM		REMARKS
(ft)	Type/No.	value	(per 6 in.)	Recovery (inches)	DESCRIPTION		Class.		
			10.10	,	Dry, light brown GRAVEL and SAND, little s	ilt, very dense		topsoil, an	ass and roots
	SPT-1	42	19-19	17"				-	
			23-25		Day light brown CDAVEL and CAND Puls	ilt vansderee	GM to SM	Hazmat sar	ripie
	SPT-2	56	16-23	19"	Dry, light brown GRAVEL and SAND, little s	lit, very dense	SIVI	Hazmat sar	mplo
	3F1-2	30	33-35	19				i iaziriai sai	npie
	33-35				Moist, gray CLAY, little sand, few gravel and	silt, hard	CL		
5	SPT-3	43	18-18	23"					
			25-44					roller bit op	en hole 4' to 24' bgs
					- TILL				
-	1								
						d - St. Joseph	01		
10	SPT-4	41	12-17	24"	Moist, gray CLAY , little sand, few gravel an	a siit, nara	CL	moisture co	ntent 17%
	SP1-4	41	24-36	24				10.6% grav 74% fines	el, 15.4% sand,
			24-30		-				18, Liquid limit 34,
_	1				-			Plastic inde	x 16
45			27-20		Moist, gray CLAY, little sand, few gravel and	l silt, hard	CL		
15	SPT-5	55		18"					
			35-45						
-									
	SPT-6	76	20-32	24"	Moist, gray CLAY, little sand, few gravel and	l silt, hard	CL		
SAMPL	E TYPES:	trac			SPT Resistance				Approve/Date
	SPLIT SPO								-
	SPLIT SPO			Cohesionles		hesive Consistency	-		
	ELBY TUBE OCK CORE	som			oose 10-29 Med. Dense Dense 50+ Very Dense	3-4 Soft, 5-8 M/S 16-30 V-Stiff, 3		Duff	
.014-11	JON JONE	11103	7.11y -00/0	30-49	DOTING DOT VOLY DOTING	10-00 v-0till, 3	ii nalu		L



PRO	JECT: Ma	ssDOT	Silver Line E	xtension					SHE	ET	BORING NO.
SITE	LOCATION	:			JOB NO	00242230			2 of	2	B-17
	MB	TA Right	t of Way		LOCATI				Elevation	on:	Total Depth:
		Chelsea	, MA		N 29	968036	E 78	84367	15.	.1'	24.5'
Dept		N Value	Blow Count (per 6 in.)	Sample Recovery (inches)			MPLE RIPTION		ASTM Class.		REMARKS
	SPT-6	76	44-63	24"	Moist	, gray CLAY, little sand	l, few gravel a	and silt, hard	CL	roller bit o	open hole to 24' bgs
					-		TILL				
	SPT-7	145	145/6"	4"	Dry, g	gray CLAY, little sand,	few gravel an	d silt, hard	CL		
30					End o	of Boring @ 24.5' bgs					
40_					- - -						
					-						
45					1						
45 SAME		trac	ce 0 to 5%				Resistance	e	<u> </u>		Approve/Date
	LE TTPES. 2" SPLIT SPO					JF I	resistant	<u> </u>			Αρριονε/Date
	3" SPLIT SPO			Cohesionles	ss Density:	0-4 Very Loose		Cohesive Consistency	/ 0-2 Ver	y Soft	
	STERB. TUBI		ne 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/S		Stiff	
RUN=	ROCK CORE	mo	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 3	1+ Hard		



PROJE	CT: Mas	SSDOT S	Silver Line E	xtension					SHE	ET	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256			1 of	2	B-17A
	MB	ΓA Right	of Way		LO	CATION:			Elevation	on: To	tal Depth:
	(Chelsea	MA			N 2968062 E 784	4314		14.	2'	21.0'
DRILL	CONTRAC	TOR:	Northern Dri	II Service	ΕN	IG: William Checchi			BEGUN	1:	12/2/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DF	RILLER: Tim Tucker			FINISH	ED:	12/2/2013
Hole Siz	ze:		Weather:		!			Ground Wa	ter (Dep	th/Elev.)	
HW	casing - 4	" ID			1	2/2/13 cloudy 40 F			5'	bgs (12/2	/13)
Drilling	Method :				Dri	lling Fluid :		Top of Rock	k (Depth):	
	Rotary	wash wit	h Roller Bit			Water			No	t Encount	ered
Depth	Sample	N	Blow Count	Sample		SAMPLE			ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)		DESCRIPTION			Class.		
				()		Moist, brown Topsoil, grass					
									SM		
						Wet, gray SAND, some gravel, little silt					
	CDT 4	4	woh/16"	0		FILL					
	SPT-1	1	1-2	0							
						Wet, black GRAVEL and SAND, little silt, lo	oose		GM to		
5	SPT-2	8	5-2	10"					SM		
			6-19								
						TILL				gray wash	
						Marian ali a Ol AV limba and famous and a		- 1:11	O.		
10	SPT-3	9	4-5	16"		Moist, olive CLAY, little sand, few gravel ar	na siit	, Stiff	CL		
	351-3	9	4-5	16							
			7.0								
45			4-10			Moist, olive CLAY, little sand, few gravel ar	nd silt	very stiff	CL		
15	SPT-4	22		20"							
			12-17								
						Moist, olive gray CLAY, little sand, few gray	vel an	d silt_verv			
20	SPT-5	27	14-10	12"		stiff		_ 5, 7013	CL		
	TYPES:	trac				SPT Resistance					Approve/Date
	SPLIT SPOO SPLIT SPOO			Cohesionles	- D	oneity: 0.4 Venul ease	ohooi	o Consisten	0.21/5-	, Coft	
	SPLIT SPOC LBY TUBE	ON little son						e Consistency Soft, 5-8 M/St	-		
	OCK CORE			30-49				0 V-Stiff, 31			



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension					SHEE	ΞT	BORING NO.
SITE L	OCATION:				JOB NO.	00242230			2 of	2	B-17A
	MB	ΓA Right	of Way		LOCATIO	N:			Elevation	n: Tot	al Depth:
	(Chelsea	, MA		N 296	8062	E 78	84314	14.2	2	31.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)			AMPLE CRIPTION		ASTM Class.		REMARKS
	SPT-5	27	17-14	12"	Moist, o	olive gray CLAY, lit	tle sand, few gr	avel and silt, very	CL		
-						Boring at 21.0' bgs					
25											
30											
35											
40_											
45					1						
SAMPL	E TYPES:	trac			ļ ļ	SI	PT Resistanc	е			Approve/Date
	SPLIT SPO			Cohosissi	no Donetti :	0.4.1/0#:1		Cabasius Ci-t	. 0.21/	Coff	
	SPLIT SPOO TERB. TUBE		e 15 to 25% ne 30 to 45%	Cohesionles 5-9 Lo		_ 0-4 Very Loose 10-29 Med. Dense		Cohesive Consistency 3-4 Soft, 5-8 M/S	_		
	OCK CORE				Dense	50+ Very Dense		16-30 V-Stiff, 3			



PROJE	CT: Mas	SSDOT S	Silver Line E	xtension					SHE	ET	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256			1 o	f 2	B-18
	MB	ΓA Right	of Way		LO	CATION:		Ī	Elevation	on: To	tal Depth:
	(Chelsea,	MA			N 2968175 E 784	4245		11	.2'	21.0'
DRILL	CONTRAC	TOR:	Northern Dri	II Service	ΕN	IG: William Checchi		I	BEGUN	۷:	11/22/2013
DRILL	RIG: A	TV Mobil	e B-48, Auto I	Hammer	DF	RILLER: Tim Tucker		I	FINISH	ED:	11/22/2013
Hole Si	ze:		Weather:		•		Groun	nd Wat	er (Dep	oth/Elev.)	
HW	casing - 4	" ID			11	1/22/13 cloudy 45 F			4.6'	bgs (11/22	2/2013)
Drilling	Method :				Dri	illing Fluid :	Top of	f Rock	(Depth	n) :	
	Rotary	wash wit	h Roller Bit			Water			No	ot Encount	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION			ASTM Class.		REMARKS
						Moist, brown Topsoil, grass Dry, tan GRAVEL and SAND, little silt			GM to		
						FILL			SM		
	SPT-1	17	3-4 13-100/2"	6"		Moist, brown-olive GRAVEL and SAND, fe rubber, medium dense	w silt and cla	ау,	GM to SM		
5_	SPT-2	8	12-15	18"		moist , black SAND,little gravel and silt,			SC		
	3F1-2	0	22-16	10		Moist, tan and olive stratified SAND, little s SAND, little clay, medium stiff	silt, loose, an	nd	SM to SC		
10	SPT-3	25	9-10 15-20	20"	-	Wet, stratified tan SAND, little silt, medium SAND, little clay, very stiff	n dense, and	I	SM to SC		
15	SPT-4	39	16-17 22-70	14"	-	Wet, tan gray stratified SAND and some cl	lay				
20	SPT-5	140	21-50	6"	-	Moist, olive gray SAND, little gravel and cladense	ay, ,few silt, [,]	very	SC	moisture co Plastic limit Plastic inde	12, Liquid limit 22,
	TYPES:	trac				SPT Resistance					Approve/Date
	SPLIT SPO									0.6	
	SPLIT SPOO LBY TUBE	ON little som		Cohesionles 5-9 Lo		· ·	Cohesive Cons				
	OCK CORE	mos		5-9 Lo 30-49			3-4 Soft, 5- 16-30 V-St			ouil	
	J OOKL	11100	, -00/0	55-45	-0116	55. 75.y Bolloo	v-0i	, 517	iuiu		



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension					SHE	ET	BORING NO.
SITE L	OCATION:				JOB NO	0024223	6		2 of		B-18
	MB	ΓA Right	of Way		LOCATIO				Elevation	on: T	otal Depth:
	(Chelsea	, MA		N 29	68175	E 7	84245	11	.2	31.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)			SAMPLE SCRIPTION		ASTM Class.		REMARKS
	SPT-5	140	90-65	6"	Moist, dense		little gravel and	clay, few silt, very	SC	gravel 16.8 fines 43.5%	3%, sand 39.7%,
25						Boring at 21.0' bç	gs				v
30											
35											
40											
45											
45 SAMPI	L E TYPES:	trac	e 0 to 5%		 	ç	SPT Resistand	ce.	<u> </u>	<u> </u>	Approve/Date
	SPLIT SPO						ו ועבאאווו ויי	,,,			Approve/Date
	SPLIT SPO			Cohesionles	ss Density:	0-4 Very Loose		Cohesive Consistency	y 0-2 Ver	y Soft	1
	TERB. TUBE		ne 30 to 45%			10-29 Med. Dense	e	3-4 Soft, 5-8 M/S	_		
RUN=R	OCK CORE	mo	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 3	1+ Hard		



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	EI	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 of	1	B-19
	MB	ΓΑ Right	of Way		LO	CATION:		Elevation	n: To	tal Depth:
	(Chelsea	, MA			N 2968304 E 78418	9	10.	6'	12.0'
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	ΕN	G: William Checchi		BEGUN	l:	11/26/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DR	ILLER: Tim Tucker		FINISH	ED :	11/26/2013
Hole Si	ze:		Weather:				Ground Wa	ater (Dep	th/Elev.)	:
HW	casing - 4	" ID			11	/26/13 cloudy 40 F			5' (11/26/	13)
Drilling	Method :				Dri	lling Fluid :	Top of Roc	k (Depth):	
	Rotary	wash wit	th Roller Bit			Water		No	t Encoun	tered
Depth	Sample	N Value	Blow Count (per 6 in.)	Sample Recovery		SAMPLE DESCRIPTION		ASTM		REMARKS
(ft)	Type/No.	value	(per 6 in.)	(inches)		DESCRIPTION		Class.		
						Moist, brown Topsoil, grass				
						Dry, light brown SAND, some gravel, little silt		SM		
						FILL	P	014		
	CDT 4	20	6-16	7"		Dry, light brown SAND, some gravel, little silt, idense	neaium	SM		
	SPT-1	36	20-11	, ,		Moist, gray silty SAND				
						Moist, gray SAND, little silt, and dark brown fin	e SAND, little	SM		
5	SPT-2	6	2-2	16"		silt, few peat, loose				
			4-5							
									olive clay w	rash
_										
10										
_			4.0			Dry, olive CLAY		CL		
	SPT-3	15	4-6	24"						
			9-11							
						End of Boring at 12' bgs				
15					_					
					-					
20										
SAMPLE	TYPES:	trac	e 0 to 5%			SPT Resistance				Approve/Date
	SPLIT SPO					T				
	SPLIT SPO			Cohesionles			ive Consistency	-		
	LBY TUBE	son		5-9 Lo 30-49			4 Soft, 5-8 M/St -30 V-Stiff, 3		uif	
		10		, 00 .0	10					i e



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	:EI	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 of	2	B-20
	MB	ΓΑ Right	of Way		LO	CATION:		Elevation	n: To	tal Depth:
	(Chelsea	, MA			N 2968420 E 784	132	9.9	9'	21.0'
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	ΕN	IG: William Checchi		BEGUN	l:	11/26/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DR	RILLER: Tim Tucker		FINISH	ED :	11/26/2013
Hole Siz	ze:		Weather:				Ground Wa	ter (Dep	th/Elev.)	
HW	casing - 4	" ID			11	1/26/13 cloudy 40 F		5.6	bgs (12/3	31/13)
Drilling	Method :		!		Dri	lling Fluid :	Top of Roc	k (Depth):	
	Rotary	wash wi	th Roller Bit			Water		No	t Encount	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
						Dry, light brown gravelly, silty SAND		SM		
	SPT-1	6	3-3	14"		Dry, black gravelly, SAND, loose		SM		
_	ODT 0		3-3	40"		FILL Wet, brown-gray gravelly, silty SAND, loose		SM		
5	SPT-2	6	5-3 3-50/0"	18"						
									drilled grave	els or cobble
									gray clayey	wash
10_	SPT-3	3	2-1	5"		Wet to Dry, olive and gray CLAY soft		CL		, pushed 3" spoon 1', 24" recovery
			2-5							
_										
			4.0			Dry, olive CLAY, very stiff				
15	SPT-4	16	4-6	22"				CL		
			10-11							
20	SPT-5	10	1-5	24"		Dry, olive CLAY, stiff		CL		
	TYPES:	trac	ce 0 to 5%			SPT Resistance				Approve/Date
	SPLIT SPO									
	SPLIT SPO			Cohesionles			hesive Consistency	•		
	LBY TUBE	son					3-4 Soft, 5-8 M/St		tiff	
א=מטאן	JUN UURE	mo	ouy <i>></i> 00%	30-49	Dens	se 50+ Very Dense	16-30 V-Stiff, 3°	ı+ ⊓ara		1



PROJI	ECT: Ma	ssDOT S	Silver Line E	xtension					SHEE	Т ВО	RING NO.
SITE	LOCATION:				JOB 1	NO.: 60242256			2 of 2	2	B-20
	MB	TA Right	of Way		LOCA	ΓΙΟΝ:			Elevation:	Total	Depth:
	(Chelsea	, MA		N	2968420	E 7	84132	9.9'		21.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPI DESCRIP			ASTM Class.	RE	MARKS
	SPT-5	10	5-5	24"	Dry	, olive CLAY, stiff			CL		
25					End	l of Boring at 21' bgs					
30											
35					- - - - -						
40					- - - -						
45 SAMPL	LE TYPES:	trac	ee 0 to 5%		-	SPT R	esistano	ce			Approve/Date
	" SPLIT SPO										
	SPLIT SPO							Cohesive Consistency			
	STERB. TUBE		ne 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/S			
KUN=h	ROCK CORE	mos	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 3	1+ Hard		



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension				SHE	ET	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 of	1	B-21
	MB	ΓA Right	t of Way		LC	CATION:		Elevation	on: To	tal Depth:
	(Chelsea,	, MA			N 2968604 E 783939		9.4	4'	12.0'
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	ΕN	IG: William Checchi		BEGUN	l:	11/26/2013
DRILL	RIG: A	ATV Mobi	le B-48, Auto I	Hammer	DF	RILLER: Tim Tucker		FINISH	ED :	11/26/2013
Hole Si	ze:		Weather:				Ground Wa	ter (Dep	th/Elev.)	
HW	/ casing - 4	" ID			11	1/26/13 cloudy 37 F			Not Evide	ent
Drilling	Method :				Dri	illing Fluid :	Top of Roc	k (Depth):	
	Rotary	wash wit	th Roller Bit	,		Water		No	t Encount	ered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
						Moist, brown SAND, some gravel, little silt		SM		
						FILL			BULK SAM	
				 		Dry, brown to black SAND, some gravel, little sil	lt, loose	SM	from driven	HW Casing
	SPT-1	8	4-4	10"						%, sand 49%,
			4-6						fines 16.2%	
5	CDT 0		6-4	8"		Dry, brown to black SAND, some gravel, little si	ilt, loose	SM		
	SPT-2	6	2-3	°		Moist, olive CLAY, medium stiff		CL		
			2.5							
10										
			6-9			Moist, olive CLAY, very stiff		CL		
	SPT-3	22		16"						
			13-17							
		ļ		 	_	End of Boring at 12' bgs				
15										
					-					
					_					
20					L					
SAMPLE	TYPES:	trac				SPT Resistance				Approve/Date
	SPLIT SPO									
	SPLIT SPOC		e 15 to 25% ne 30 to 45%	Cohesionles 5-9 Lo			ve Consistency Soft, 5-8 M/St	-		
	OCK CORE		ne 30 to 45% stlv >50%	30-49			30 V-Stiff. 3		uil	



PROJE	CT: Mas	SDOT S	Silver Line E	xtension			SHE	ET	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256		1 of	f 2	B-22
	MBT	TA Right	of Way		LOCATION:		Elevation	on: To	tal Depth:
	(Chelsea,	MA		N 2968763 E 783811	I	12.	.6'	21.0'
DRILL	CONTRAC	TOR:	Northern Dri	II Service	ENG: William Checchi		BEGUN	\ :	11/25/2013
DRILL	RIG: A	TV Mobil	e B-48, Auto I	Hammer	DRILLER: Tim Tucker		FINISH	ED:	11/25/2013
Hole Siz			Weather:			Ground Wa	iter (Dep	oth/Elev.):	
	casing - 4	" ID			11/25/13 clear 22 F				ing removed
Drilling I	Method :				Drilling Fluid :	Top of Rocl		•	
	Rotary	wash wit	th Roller bit	Т	WATER		No	ot Encount	ered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS
	SPT-1	12	7-6	14"	Dry, red-brown GRAVEL and SAND, medium of red brick fragments	lense,			
	3F1-1	12	6-7	14			GP to	Hazmat sam	pple
	SPT-2	7	5-4	10"	Dry, red-brown GRAVEL and SAND, loose, red brick fragments		SP	Hazmat sam	pple
			3-5						
5			4-3		Dry, brown gravelly, SAND and SILT, loose		SM to		
	SPT-3	6			FILL		ML		
			3-3						
<u> </u>									
									al at 8' bgs, roller bit
	SPT-4	100	100/1"	1"	angular gravel fragments (wash)		GP	anead, casii	ng set to 9' bgs
10							Oi		n hole 9' to 24' bgs
								gravels or co	obbles from 9' to 11.5' bgs
			woh 4		Moist, olive CLAY, trace fine gravel, stiff		C		
15	SPT-5	10	woh-4	16"			CL	Moisture con	ntent 27% 25, Liquid limit 50,
			6-10					Plastic index	
-									
	ODT 0	40	7.7	40"					
20	SPT-6	16	7-7	18"	Dry to Moist, olive CLAY, very stiff		CL		
	TYPES: SPLIT SPO	trac			SPT Resistance				Approve/Date
	SPLIT SPOO SPLIT SPOO			Cohesionles	s Density: 0-4 Very Loose Cohes	ive Consistency	0-2 Ver	y Soft	
	LBY TUBE	som				4 Soft, 5-8 M/St	•	-	
RUN=RC	CK CORE	mos	stly >50%	30-49	Dense 50+ Very Dense 16	-30 V-Stiff, 31	I+ Hard		



PROJE	ECT: Mas	ssDOT S	Silver Line E	xtension					SHEET	Г ВС	RING NO.
SITE	LOCATION:					NO.: 60242256			2 of 2		B-22
	MB	ΓA Right	of Way		LOC	ATION:			Elevation:	Total	Depth:
	(Chelsea	, MA		1	1 2968763	E 7	84811	12.6		21.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMP DESCRIF			ASTM Class.	RE	MARKS
	SPT-6	16	9-11	18"		ry to Moist, olive CLAY, very	stiff		CL		
25					- -	nd of Boring @ 21.0'					
30					-						
35					- - -						
40					- - - -						
45					1						
45 SAMPL	E TYPES:	trac	ce 0 to 5%			SPT I	Resistanc	ce	 		Approve/Date
	' SPLIT SPO					51 1 1	Josiolaine				pp. 0 v 0/ Dato
	SPLIT SPO			Cohesionles	ss Den	oity: 0-4 Very Loose		Cohesive Consistency	/ 0-2 Very So	oft	
	TERB. TUBE		ne 30 to 45%	5-9 Lo	oose	10-29 Med. Dense		3-4 Soft, 5-8 M/S	tiff, 9-15 Stiff		
RUN=R	OCK CORE	mos	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 3	1+ Hard		



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension				SHE	ET	BORING NO.
SITE L	OCATION:				JC	DB NO.: 60242256		1 of	2	B-23
	MB	ΓΑ Right	t of Way		LC	OCATION:		Elevation	n: To	tal Depth:
	(Chelsea,	, MA			N 2968922 E 783601		10.	0'	21.0'
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	E١	NG: William Checchi		BEGUN	l:	11/25/2013
DRILL	RIG:	TV Mobi	le B-48, Auto I	Hammer	DF	RILLER: Tim Tucker		FINISH	ED :	11/25/2013
Hole Si	ze:		Weather:				Ground Wa	ter (Dep	th/Elev.):	
HW	/ casing - 4	" ID			1	1/25/13 cloudy 27 F		5.3	bgs (11/2	29/13)
Drilling	Method :	•	•		Dr	illing Fluid :	Top of Rocl	k (Depth):	
	Rotary	wash wi	th Roller bit			WATER		No	t Encount	ered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
	SPT-1	26	38-15	18"		Dry, brown-black GRAVEL and SAND, medium	dense			
	3F1-1	20	11-9	10		FILL		GW to SW	Hazmat san	nple
	SPT-2	23	12-13	18"		Dry, brown-black GRAVEL and SAND, medium	dense	Svv	Hazmat san	nple
			10-6			Maint area CLAV				
5_	ST-2	-	push tube	19"		Moist, gray CLAY		CL		
	SPT-3	16	12-10	18"		Wet, gray stratified SAND, little gravel, and fine silt, medium dense	SAND, little	SP to SM		
			6-7		_			Civi		
						Dry, olive CLAY, trace gravel, sand, and silt, ver	ry stiff		roller bit ope	an hole
10_	SPT-4	18	4-9	18"		bry, onve derti, trade graver, sand, and sint, ver	y Juli	CL	from 9' to 19	
			9-12							
			2.7			Dry to Moist, olive CLAY, trace fine gravel and s	ilt, very stiff	CI.		
15_	SPT-5	17	3-7	22"				CL		
			10-11							
	1									
	SPT-6	9	5-4	6"		Moist, olive CLAY, trace fine gravel and silt, stiff		CL		
SAMPI F	E TYPES:	trac		-		SPT Resistance		l		Approve/Date
	SPLIT SPO									
SS3=3"	SPLIT SPO	ON little	15 to 25%	Cohesionles	ss D	ensity: 0-4 Very Loose Cohesiv	ve Consistency	0-2 Ver	y Soft	
ST=SHE	ELBY TUBE	som	ne 30 to 45%	5-9 Lo	oose	10-29 Med. Dense 3-4	Soft, 5-8 M/St	tiff, 9-15 S	tiff	
RUN=R	OCK CORE	mos	stlv >50%	30-49	Den	se 50+ Very Dense 16-3	30 V-Stiff. 31	1+ Hard		



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension					SHE	ET	BORING NO.
SITE L	OCATION:				JOE	NO.: 602422	256		2 of	2	B-23
	MB	ΓΑ Right	of Way		LO	ATION:			Elevatio	n: T	Total Depth:
	(Chelsea,	MA			N 2968922	E 7	83601	10.	0'	21.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		D	SAMPLE ESCRIPTION		ASTM Class.		REMARKS
	SPT-6	9	5-5	6"		Moist, olive CLAY, tra	ce fine gravel and	silt, stiff	CL		
25						End of Boring @ 21.0	bgs			PVC : bento	Monitoring Well set : screen from 9' to 19' bgs, onite seal 5.5' t0 7.5' bgs water infiltrating well from adjacent puddle
35					-						
40											
45	TV===						ODT D				- Ann. 15
	E TYPES: SPLIT SPO	trac ON few					SPT Resistant	ce			Approve/Date
	SPLIT SPOO			Cohesionles	s De	sity: 0-4 Very Loos	se	Cohesive Consistency	y 0-2 Verv	Soft	
	TERB. TUBE		ne 30 to 45%			10-29 Med. De		3-4 Soft, 5-8 M/S	_		
	OCK CORE			30-49	Dense	50+ Very Dens	e	16-30 V-Stiff, 3			



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	EI	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 of	2	B-24
	MB	ΓΑ Right	of Way		LO	CATION:		Elevation	n: To	otal Depth:
	(Chelsea	, MA			N 2968991 E 7835	02	9.8	3'	21.0'
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	ΕN	G: William Checchi		BEGUN	l:	11/26/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DR	ILLER: Tim Tucker		FINISH	ED :	11/26/2013
Hole Siz	ze:		Weather:		,		Ground Wa	ater (Dep	th/Elev.)	:
HW	casing - 4	" ID			11/2	26/13 light snow 36 F		4'	bgs (11/2	6/13)
Drilling	Method :				Dri	lling Fluid :	Top of Roc	k (Depth):	
	Rotary	wash wit	th Roller Bit			Water		No	t Encoun	tered
Depth	Sample	N	Blow Count	Sample		SAMPLE		ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)		DESCRIPTION		Class.		
				,		Dry, brown SAND, some gravel, few silt and	clay			
						FILL		SW		
						Dry brown CAND, some ground four silt and	alau madium			7,231 ohm-cm
	SPT-1	17	8-9	18"		Dry, brown SAND, some gravel, few silt and dense	ciay, medium	SW		intent 38 mg/kg itent 120 mg/kg
	3F1-1	17	8-6	10					рH= 5.9 (di	stilled water)
						Dry, olive CLAY, trace gravel, sand, and silt,	very stiff	CL		
5	SPT-2	24	6-9	22"						
			15-23							
						Maint alive CLAV very stiff		CI		
10	SPT-3	17	7-8	8"		Moist, olive CLAY, very stiff		CL		
	3F1-3	17	9-13	0						
			0 10							
45			4-9			Wet, olive stratified 1" to 5" SAND, little silt, t		SC to		
15	SPT-4	19		16"		medium dense, and 4" CLAY, trace sand and	I silt, very stiff	CL		
			10-11							
	_									
20	SPT-5	13	6-6	10"		Wet, light brown SAND, little silt, medium der	nse	SM		
	TYPES:	trac				SPT Resistance				Approve/Date
	SPLIT SPO			0.1		To a division of the state of t			0.7	-
	SPLIT SPOO LBY TUBE	ON little son		Cohesionles 5-9 Lo			esive Consistency 3-4 Soft, 5-8 M/S	-		
	OCK CORE			30-49			16-30 V-Stiff, 3			



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension					SHEE	T BORING NO.
SITE L	OCATION:				JOB NO	60242256	1		2 of 2	2 B-24
	MB	ΓA Right	of Way		LOCATION	ON:			Elevation:	Total Depth:
	(Chelsea,	, MA		N 29	68991	E 7	83502	9.8'	21.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)			AMPLE CRIPTION		ASTM Class.	REMARKS
	SPT-5	13	7-7	10"	Wet, I	ight brown SAND,li	ttle silt, medium	dense	SM	
25					End o	f Boring at 21' bgs				
30										
35										
40										
-										
45										
	TYPES:	trac				S	PT Resistanc	e		Approve/Date
	SPLIT SPOO			Cohesionlas	e Donoity	0-4 Very Loose		Cohosiva Consistensi	, 0-2 \/on, c	oft
	SPLIT SPOC TERB. TUBE		e 15 to 25% ne 30 to 45%	Cohesionles 5-9 Lo		0-4 Very Loose 10-29 Med. Dense		Cohesive Consistency 3-4 Soft, 5-8 M/S	_	
	OCK CORE				Dense	50+ Very Dense		3-4 Sort, 5-8 N/S		



PROJE	CT: Mas	ssDOT (Chelsea Exte	ension		SHE	EET BORING NO.
SITE L	OCATION:				JOB NO.: 60242256	1 0	f 2 B-25
	MB	ΓA Right	of Way		LOCATION:	Elevation	on: Total Depth:
		Chelsea,	MA		N 2969045 E 783434	10	21.0
	CONTRAC	TOR:	Northern Dri	II Service	ENG: William Checchi	BEGUN	11/20/2010
DRILL	•	ATV Mobi	le B48, Auto F	lammer	ORILLER: Tim Tucker	FINISH	11/20/2010
Hole Si	ze:		Weather:		Ground Wa	ater (Dep	oth/Elev.) :
	/ casing - 4	" ID	11/25/	13 partly			de 14' of casing (11/26/13)
Drilling	Method :				Drilling Fluid : Top of Roo		,
	Rotary	wash wi	th Roller bit		WATER	No	ot Encountered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION	ASTM Class.	REMARKS
			27-12		Dry, brown and black GRAVEL and SAND, few silt, medium dense	n	
	SPT-1	23		18"	FILL		Hazmat sample
			11-7		Dry, brown and black GRAVEL and SAND, few silt, dense	GW to SW	,
	SPT-2	44	8-12	12"			Hazmat sample
			32-15				_
5	CDT 0	0.4	8-12	8"	Moist, tan GRAVEL and SAND, few silt, medium dense	GW to SW	
	SPT-3	24	12-16	8			
			12-10				
							Silty SAND wash, some gravel water at 8.8' bgs inside 14' of HW casing(11/26/14)
10			10-7		Wet, tan SAND, few silt, medium dense	SW	
	SPT-4	14		14"			
			7-8				
_							
15			9-16		Wet, light brown tan SAND, little silt, few gravel, dense	SM	
13	SPT-5	31	15-13	14"			
			10 10				
							Silve SAND woods comes are
							Silty SAND wash, some gravel
20	SPT-6	40	11-16	8	Wet, light brown SAND, little silt, few gravel, dense	SM	
20 SAMPL	E TYPES:	trac			SPT Resistance		Approve/Date
	SPLIT SPO				2		
	SPLIT SPO	ON little		Cohesionles	Density: 0-4 Very Loose Cohesive Consistence	y 0-2 Ver	ry Soft
	ELBY TUBE	som					Stiff
KUN=R	OCK CORE	mos	stly >50%	30-49	ense 50+ Very Dense 16-30 V-Stiff, 3	1+ Hard	



PROJI	ECT: Ma	ssDOT (Chelsea Exte	ension					SHEE	Т	BORING NO.
SITE	LOCATION:	•			JOB	NO.: 60242256			2 of 2	2	B-25
	MB ⁻	TA Right	t of Way		LOC	ATION:			Elevation	: Tota	al Depth:
	1	Chelsea	, MA		N	2969045	E 7	'83434	10.1		21.0
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLI DESCRIPT			ASTM Class.	ļ	REMARKS
	SPT-6	40	24-17	8	W	et, light brown SAND, little silt,	few gra	avel, dense	SM		
25					- -	nd of Boring @ 21.0' bgs					
35					-						
40					- - -						
45	E TYPES:		04-50		-	CDT D	oniotos -				Approve/Deta
	LE TYPES: " SPLIT SPO	trac ON few				SPT Re	sololdi l	. с			Approve/Date
	SPLIT SPO			Cohesionles	ss Dens	ity: 0-4 Very Loose		Cohesive Consistence	y 0-2 Very S	Soft	
	STERB. TUBE		ne 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/S	_		
RUN=F	OCK CORE	mo	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 3	1+ Hard		



PROJE	ECT: Mas	ssDOT S	Silver Line E	xtension			SHE	ET	BORING NO.
SITE	LOCATION:				JOB NO.: 60242256		1 of	4	B-26
	MB	ΓΑ Right	of Way		LOCATION:		Elevatio	on: To	otal Depth:
		Chelsea,	-		N 2969182 E 783262	2	10.	.8'	71.0'
DRILL	CONTRAC		Northern Dr	ill Service	ENG: William Checchi	ı	BEGUN]: 	1/20/2014
DRILL	RIG: A	TV Mobil	e B-48, Auto I		DRILLER: Tim Tucker		FINISH	ED:	1/21/2014
Hole S			Weather:			Ground Wat	ter (Dep	th/Elev.)	
HV	V Casing - 4	" ID		01/20/14	sloudy 34 F; 01/21/14 cloudy 13 F				gs (1/23/14)
	Method :				Drilling Fluid :	Top of Rock			, , , , , , , , , , , , , , , , , , ,
		Wash wi	th Roller Bit		Water	'		r t Encoun	tered
	1101017								
Depth	Sample	N	Blow Count	Sample	SAMPLE		ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery	DESCRIPTION		Class.		KLWAKKO
				(inches)	Dry, roadbed ballast stone and black GRAVEL	and SAND			
					few silt		GW to	Hand auge	to 6' bgs (1/14/14)
	BULK						SW	Hazmat sar	nple
									%, sand 55.6%
	SAMPLE				Dry, tan SAND, some gravel, few silt			fines 10.8% Hazmat sar	
					bry, tair 6, 1115, 36me graver, rew 3iit		SW		
5									
Ĭ	-							sand, grave	el, and silt in wash
					Wet, tan SAND, some gravel, little silt, medium	dense			
	SPT-1	18	10-10	10"	Wet, tall SAND, Some graver, little Silt, medicin	delise	SM		
	51 1-1	10	8-8	10					
-			0-0						
					Wet, tan SAND, some gravel, trace silt, mediur	n donco		water level (01/21/14)	at 8.8' inside 64' casing
10_	SPT-2	19	7-13	8"	Wet, tall SAND, some graver, trace siit, medidi	ii delise	SW	(01/21/11)	
	OI 1-2	13	6-8						
			0.0						
-								sand, silt, a	nd fine gravel in wash
					Wet, tan SAND, some gravel, few silt, medium	dense	SW		
15	SPT-3	20	10-11	10"			O V V		
			9-7						
-								sand, silt, a	nd fine gravel in wash
-									
20	SPT-4	27	8-13	16"	Wet, tan SAND, some gravel, few silt , medium	dense	SW		
	E TYPES:	trac	e 0 to 5%	`	SPT Resistance			·	Approve/Date
SPT=2'	SPLIT SPO	ON few	5 to 10%						
	SPLIT SPOO		15 to 25%	Cohesionles	s Density: 0-4 Very Loose Cohes	ive Consistency	0-2 Ver	y Soft	
	TERB. TUBE					4 Soft, 5-8 M/Stif		itiff	
RUN=R	OCK CORE	mos	stly >50%	30-49	Dense 50+ Very Dense 16	-30 V-Stiff, 31-	+ Hard		



PROJE	CT: Mas	SSDOT S	Silver Line E	xtension			SHE	ET	BORING NO.
SITE I	OCATION:				JOB NO.: 60242256		2 o	f 4	B-26
	MBT	ΓA Right	of Way		LOCATION:		Elevation	on: To	tal Depth:
	(Chelsea	, MA		N 2969182 E 7	783262	10	.8'	71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS
	SPT-4	27	14-10	8"	Wet, tan SAND, some gravel, few silt, m	edium dense	SW	sand, grave	l, and silt in wash
25	- SPT-5	31	12-16 15-12	12"	Wet, tan SAND, some gravel, few silt, de	ense	SW		
30	SPT-6	20	10-12 8-10	12"	Wet, tan stratified, SAND, some gravel, medium dense	and SAND, few silt,	SW	2" layers of	SAND, few silt
35	SPT-7	40	7-19 21-16	16"	Wet, tan stratified GRAVEL, some sand, silt, dense	and SAND, little	GW to SM	sand grave	I, and silt in wash
40	SPT-8	23	9-11 12-11	12"	Wet, tan stratified, SAND, some gravel, medium dense	and SAND, little silt,	SW to SM	sanu, grave	i, and siit iii wasri
	SPT-9 E TYPES:	15		14"	Wet, tan SAND, little silt, medium dense		SM	sand, silt, a	nd fine gravel in wash Approve/Date
	SPLIT SPOO			Cohooisala	es Dansity: 0-4 Vary Lacca	Cohorivo Consister	, 021/5-	v So#	
	SPLIT SPOO TERB. TUBE		e 15 to 25% ne 30 to 45%	Cohesionles 5-9 Lo		Cohesive Consistency 3-4 Soft, 5-8 M/St	-	-	
	OCK CORE			30-49		16-30 V-Stiff, 3		1	



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension		SHI	EET	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256	3 0	f 4	B-26
	МВТ	ΓA Right	of Way		LOCATION:	Elevati	on:	Total Depth:
	(Chelsea,	MA		N 2969182 E 783262	10	.8'	71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION	ASTM Class.		REMARKS
	SPT-9	15	8-9	14"	Wet, tan SAND, little silt, medium dense	SM	sand, silt, wash	occasional fine gravel in
50	- SPT-10	15	6-7 8-12	14"	Wet, tan stratified coarse SAND, and medium to fine S little silt, medium dense	SAND, SM		
55	SPT-11	20	4-9 11-10	10"	Wet, tan SAND, little gravel and silt, medium dense	SM		64' bgs (1/20/14),
60	- SPT-12	23	6-10 13-13	16"	. Wet, tan medium to fine SAND, little silt, medium dens	e SM	siity sand	came in overnight to 56' bgs
65	SPT-13	41	16-24 17-11	10"	Wet, tan stratified medium to fine SAND, little silt, dense and tan CLAY, hard	Se, SM to CL		
	CDT 44	20	7.10	21"	Wet, tan stratified CLAY, very stiff, and SAND, little sil	t, CL to		and occasional fine gravel in y on washout rods
70	SPT-14	26	7-12	21	medium dense	SM		T .
SPT=2" SS3=3" : OT=OST	E TYPES: SPLIT SPOO SPLIT SPOO TERB. TUBE OCK CORE	ON little	5 to 10%		ose 10-29 Med. Dense 3-4 Soft, 5	sistency 0-2 Ve -8 M/Stiff, 9-15 stiff, 31+ Hard	-	Approve/Date



PROJE	CT: Ma	ssDOT	Silver Line E	xtension					SHE	EET	BORING NO.
SITE I	OCATION:				JOB NO	0.: 60242256			4 of	f 4	B-26
	MB	TA Right	t of Way		LOCATION				Elevation	on: T	otal Depth:
		Chelsea	, MA		N 29	69182	E 7	83262	10	.8'	71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)			AMPLE CRIPTION		ASTM Class.		REMARKS
71	SPT-14	26	14-21	21"		an stratified CLAY, m dense	very stiff, and S	SAND, little silt,	CL to SM		
75						f Boring @ 71.0' bg	S		CM	from 22' to	and cement Grout placed of 71' bgs Monitoring well set: screen from 10' to 20' bgs nite seal from 6' to 7' bgs
80											
85											
90											
SAMDI	E TYPES:	tro	ce 0 to 5%			C	PT Resistand	<u> </u>			Approve/Date
	E TYPES: SPLIT SPO	trac ON few				5	r i Kesistand	, C			Approve/Date
	SPLIT SPO			Cohesionles	ss Density:	0-4 Very Loose		Cohesive Consistency	y 0-2 Ver	y Soft	7
	TERB. TUBE		ne 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/S	_		
RUN=R	OCK CORE	mo	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 3	1+ Hard		



PROJE	CT: Mas	SSDOT S	Silver Line E	xtension				SHE	ET	BORING NO.
SITE L	OCATION:				JC	DB NO.: 60242256		1 of	4	B-26A
	MBT	ΓA Right	of Way		LC	OCATION:		Elevation	n: To	tal Depth:
	(Chelsea	MA			N 2969240 E 7830	59	10.	8'	71.0'
DRILL	CONTRAC	TOR:	Northern Dri	Il Service	Εſ	NG: William Checchi		BEGUN	l:	1/21/2014
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DI	RILLER: Tim Tucker		FINISH	ED:	1/23/2014
Hole Siz	ze:		Weather:		-		Ground Wa	ter (Dep	th/Elev.)	
HW	Casing - 4	" ID		01/21/14	clo	udy 15 F; 01/23/14 cloudy 20 F		9'	bgs (1/21	/14)
Drilling	Method :				Dr	illing Fluid :	Top of Roc	k (Depth):	
	Rotary \	Nash wi	th Roller Bit	Water				No	t Encount	tered
Depth	Sample	N	Blow Count	Sample		SAMPLE		ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)		DESCRIPTION		Class.		
				()		Dry, roadbed ballast stone and black sandy,	silty GRAVEI		Air Knife to	6' bgs (1/16/14)
					-		o, O	GP-GM	7 7	o 290 (17 107 117
	BULK					FILL				
	SAMPLE									
						Dry, tan gravelly, silty SAND		SW		
5					-				Silty SAND	wash, some fine gravel
	ODT 4	07	6-15	0,1		Dry, tan sandy, silty GRAVEL, medium dens	е	GW		
	SPT-1	27		6"						
			12-10							
					-	Wet top silty CRAVEL and SAND dance		GW to		
10	SPT-2	39	42-23	8"		Wet, tan silty GRAVEL and SAND, dense		SW		
	0112	00	16-15							
					-				Silty SAND	wash, some fine gravel
15			40-16			Wet, tan silty GRAVEL and SAND, medium of	dense	GW to SW		
"	SPT-3	29		3"				300		
			13-16							
									Silty SAND	wash, some fine gravel
										,
	SPT-4	22	22.10	8"		Wet top grovelly eith CAND done		CM		
20		32	22-19	0		Wet, tan gravelly, silty SAND, dense		SM		A
	: TYPES: SPLIT SPO(trac ON few				SPT Resistance				Approve/Date
	SPLIT SPOC			Cohesionle	ss D	ensity: 0-4 Very Loose Coh	esive Consistency	0-2 Ver	/ Soft	
	ERB. TUBE						3-4 Soft, 5-8 M/St	-		
RUN=RC	OCK CORE	mos	stly >50%	30-49	Der	se 50+ Very Dense	16-30 V-Stiff, 3	1+ Hard		



PROJE	CT: Ma	ssDOT S	Silver Line E	xtension			SHE	ET	BORING NO.
SITE I	OCATION:				JOB NO.: 60242256		2 o		
	MB	ΓA Right	of Way		LOCATION:		Elevation	on: To	tal Depth:
	(Chelsea	, MA		N 2969240 E 7	83059	10	.8'	71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS
	SPT-4	32	13-13	8"	Wet, tan gravelly, silty SAND, dense		SM	Silty SAND	wash, some fine gravel
25_	- SPT-5	50	45-30 20-12	7"	Wet, tan gravelly, silty SAND, very dense	Э	SM	gravel ii	ı SPT tip
30	SPT-6	24	36-12 12-14	6"	Wet, tan, gravelly, silty SAND, medium d	lense	SM		wash, some fine gravel n SPT tip
35	SPT-7	26	11-13 13-13	12"	Wet, tan gravelly, silty SAND, medium do	ense	SM	4" HW casii	wash, some fine gravel ng to 34' (1/21/14) ng to 69' (1/23/14)
40	ODT 0		11-15		Wet, tan stratified gravelly SAND and silt SAND, medium dense	ty medium to fine	SW to	Silty SAND	wash, some fine gravel
	SPT-8	26	11-12	14				Silty sand w	rash, little fine gravel
45	SPT-9	36	13-11	5"	Wet, gravelly, silty SAND, dense		SM		
	E TYPES: SPLIT SPO	trac			SPT Resistance	ce			Approve/Date
SS3=3"	SPLIT SPOO SPLIT SPOO TERB. TUBE	ON little			•	Cohesive Consistency 3-4 Soft, 5-8 M/St	-	-	
RUN=R	OCK CORE	mos	stly >50%	30-49	Dense 50+ Very Dense	16-30 V-Stiff, 3	1+ Hard		



PROJE	ECT: Mas	ssDOT S	Silver Line E	xtension			SHE	ET	BORING NO.
SITE	LOCATION:				JOB NO.: 60242256		3 of	4	B-26A
	MBT	ΓA Right	of Way		LOCATION:	Ele	evatio	n: To	tal Depth:
	(Chelsea	, MA		N 2969240 E 78	83059	10.8	3'	71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		STM lass.		REMARKS
	SPT-9	36	25-26	5"	Wet, tan gravelly, silty SAND, dense	S	SM	Silty sand w	ash, few fine gravel
50_	SPT-10	32	26-15 17-7	6"	Wet, tan gravelly, silty SAND, dense	S		gravel in SP Silty sand w	T tip ash, few fine gravel
55	SPT-11	23	12-11 12-18	2"	Wet, tan gravelly, silty SAND, medium de	ense	1		3" up into casing after wash twice before SPT- T tip
60_	SPT-12	17	20-10	4"	Wet, tan ghravelly, silty SAND, medium o	dense		Silty sand w gravel in SP	ash, little fine gravel T tip
65_	SPT-13	25	6-7	10"	Wet, tan gravelly, silty SAND, medium de	ense	SM	Silty sand w	ash, little fine gravel
			18-14				,	Silty sand w	ash, little fine gravel
70	SPT-14	23	13-11	0		,	SM)	3" spoon to	71'- no recovery
	.E TYPES: ' SPLIT SPO(trac			SPT Resistanc	e			Approve/Date
	SPLIT SPOO		5 to 10% 15 to 25%	Cohesionles	s Density: 0-4 Very Loose	Cohesive Consistency 0-	-2 Verv	Soft	
	STERB. TUBE			5-9 Lc	· ·	3-4 Soft, 5-8 M/Stiff, 9	-		
RUN=R	OCK CORE	mos	stly >50%	30-49	Dense 50+ Very Dense	16-30 V-Stiff, 31+ H	Hard		



PRO	JECT: Ma	ssDOT S	Silver Line E	xtension					SHE	ET	BORING NO.
SITE	LOCATION				JOB NO.: 60242256				4 o	f 4	B-26A
	MB	TA Right	of Way		LOCAT				Elevation	on: 1	otal Depth:
		Chelsea	, MA		N 2	2969240	E 7	83059	10	.8'	71.0'
Dept	h Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)			AMPLE CRIPTION		ASTM Class.		REMARKS
71	SPT-14	23	12-14	0					(SM)	3" spoon	to 71'- no recovery
75_					End	of Boring @ 71.0' bg	s			bentonite from 0' to	and cement Grout placed 71' bgs
80_											
85_											
90_											
SAMP	L L LE TYPES:	trac	e 0 to 5%		1—1—	S	PT Resistance	ce	<u> </u>	ļ	Approve/Date
	2" SPLIT SPO							1			
	B" SPLIT SPO			Cohesionles	ss Density	0-4 Very Loose		Cohesive Consistency	/ 0-2 Ver	y Soft	
	STERB. TUBE		ne 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/St		Stiff	
RUN=	ROCK CORE	mo	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 3	1+ Hard		



PROJE	CT: Mas	ssDOT \$	Silver Line E	Extension				SHE	ET	BORING NO.		
SITE L	OCATION:				JO	B NO.: 60242256		1 of	f 1	B-27		
	MBT	ΓA Right	t of Way		LO	CATION:		Elevation	on: To	tal Depth:		
	(Chelsea	, MA			N 2969272 E 782923		10.	.7'	12.0		
DRILL	CONTRAC	TOR:	Northern Dr	ill Service	ΕN	IG: William Checchi		BEGUN	1:	1/23/2014		
DRILL	RIG: A	ATV Mob	ile B48, Auto I	Hammer	DF	RILLER: Tim Tucker		FINISH	ED:	1/23/2014		
Hole Si	ze:		Weather:				Ground Wa	ter (Dep	oth/Elev.):			
NV	V Casing - 3"	' ID			1	/23/14 cloudy 20 F		6.0' bgs (1/23/14)				
Drilling	Method :		-		Dri	lling Fluid :	Top of Roc	k (Depth	(Depth):			
	Rotary	wash wi	th Roller Bit			Water		No	t Encount	tered		
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS		
						Dry, Ballast stone and black GRAVEL and SAN	D, little silt	GM to SM	Air Knife to	5.5' bgs (1/16/14)		
	Bulk Sample					Dry, tan SAND, some gravel, little silt		SM				
5												
	- SPT-1	27	8-9 8-9	- 6"		Wet, tan SAND, little gravel, few silt, medium de	ense	SW				
10	- SPT-2	9	6-5	- 1"		Wet, tan SAND, little gravel and silt, loose		SM	1" gravel in repushed S	SPT tip, PT 10' to 12', 6" recovery		
						End of Boring @ 12.0' bgs						
15												
CAMPL	TVDEO		0 1- 501	-		CDT Desigtence				Approve/Data		
	E TYPES: SPLIT SPOO	trac ON few		 		SPT Resistance				Approve/Date		
	SPLIT SPOC			Cohesionles	ss De	ensity: 0-4 Very Loose Cohesi	ve Consistency	0-2 Ver	y Soft			
	LBY TUBE		ne 30 to 45%				Soft, 5-8 M/St	-				
RUN=R	OCK CORE	mo	stlv >50%	30-49	Dens							



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension			SHE	ET	BORING NO.
SITE I	OCATION:				JOB NO.: 60242256		1 of	4	B-28
	MB	ΓΑ Right	of Way		LOCATION:		Elevation	n: To	tal Depth:
	(Chelsea,	, MA		N 2969288 E 782872	!	10.	5'	71.0'
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	ENG: William Checchi		BEGUN	l:	1/16/2014
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DRILLER: Tim Tucker		FINISH	ED :	1/17/2014
Hole S	ze:		Weather:			Ground Wa	ter (Dep	th/Elev.):	
HV	/ Casing - 4	" ID	01/	16/14 clou	dy 36 F; 01/17/14 partly cloudy 38 F		8.5	bgs (1/1	7/14)
Drilling	Method:	,			Drilling Fluid :	Top of Rock	(Depth):	
	Rotary \	Wash wi	th Roller Bit		Water		No	t Encount	ered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS
					Dry, roadbed ballast stone and black GRAVEL	and SAND,	GM to SM		
_	-				Dry, tan GRAVEL and SAND, little silt		GM to	Air Knife fro	m 0' to 6' (1/16/14)
5								Silty sand w	ash, some fine gravel
	SPT-1	34	10-17 17-17	10"	Dry, tan GRAVEL and SAND, little silt, dense		GM to SM	water at 8.5 casing (1/17	' bgs inside 44' of HW /14)
10	SPT-2	17	6-10 7-6	8"	Wet, tan GRAVEL and SAND, little silt, medium	dense	GM to SM	Resistivity=	mple at 9' bgs 10,527 ohm-cm 1 Sulfate not detected led water)
_								Silty sand w	ash, some fine gravel
15	SPT-3	15	7-8 7-9	6"	Wet, tan GRAVEL and SAND, little silt, medium	dense	GM to SM	gravel in SF	T tip
								Silty sand w	ash, some fine gravel
	SPT-4	30	19-21	6"	Wet, tan GRAVEL and SAND, little silt, dense		GM to		
20 SAMPL	E TYPES:	trac			SPT Resistance		SM	gravel in SF	T tip Approve/Date
	SPLIT SPO				Oi i Nosidario				, 195101010
SS3=3"	SPLIT SPO	ON little	15 to 25%	Cohesionles	s Density: 0-4 Very Loose Cohesi	ve Consistency	0-2 Ver	y Soft	
	TERB. TUBE					Soft, 5-8 M/Sti		tiff	
RUN=R	OCK CORE	mos	stly >50%	30-49	Dense 50+ Very Dense 16-	30 V-Stiff, 31	+ Hard		



PROJECT: Ma	ssDOT S	Silver Line E	xtension			SHE	ET	BORING NO.
SITE LOCATION	:			JOB NO.: 60242256		2 of		
ME	TA Right	of Way		LOCATION:	E	Elevatio	on: To	tal Depth:
	Chelsea,	MA		N 2969288 E 7	82872	10.	5'	71.0'
Depth Sample (ft) Type/No		Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS
SPT-4	30	9-6	6"	Wet, tan GRAVEL and SAND, little silt, o	dense	GM to SM	gravel in SF	PT tip
25		8-6		Wet, tan GRAVEL and SAND, little silt, r	nedium dense	GM to SM	Silty sand w	rash, some fine gravel
SPT-5	14	8-11	6"				Silty sand w (SM)	rash, some fine gravel
30SPT-6	16	5-9 7-6	6"	Wet, tan GRAVEL and SAND, little silt,	medium dense	GM to SM		rash, some fine gravel
35SPT-7	10	5-4 6-7	10"	Wet, tan stratified GRAVEL, some sand, silt, medium dense	and SAND, little	GW to SM	(SM) Silty sand w	vash, some fine gravel
40SPT-8	16	6-8 8-5	- 6"	Wet, tan GRAVEL and SAND, little silt, r	nedium dense	GM to SM	(SM) Silty sand w	vash, little fine gravel (SM)
45 SPT-9 SAMPLE TYPES:	11 trac	6-6 e 0 to 5%	6"	Wet, tan GRAVEL and SAND, little silt, r	neaium aense	GM to SM		Approve/Date
SPT=2" SPLIT SPC								, ,
SS3=3" SPLIT SPC OT=OSTERB. TUB RUN=ROCK CORI	E som	ne 30 to 45%	Cohesionles 5-9 Lo 30-49 I	ose 10-29 Med. Dense	Cohesive Consistency 3-4 Soft, 5-8 M/Stiff 16-30 V-Stiff, 31+	f, 9-15 S		



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension			SHE	ET	BORING NO.
SITE I	OCATION:				JOB NO.: 60242256		3 of		
	MBT	ΓA Right	of Way		LOCATION:		Elevation	on: To	tal Depth:
	(Chelsea	, MA		N 2969288 E 7	82872	10	.5'	71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS
	SPT-9	11	5-5	6"	Wet, tan GRAVEL and SAND, little silt, n	nedium dense	GM to SM	3" Roller Bit from 44' to 8	used to washout casing 59'
50_	SPT-10	13	6-6 7-7	3"	Wet, tan GRAVEL, some sand, little silt,	medium dense	GM	gravel in SF	
55_	- SPT-11	12	4-7 5-5	3"	Wet, tan SAND, little gravel and silt, med	dium dense	SM	Silty sand 1 washout, re	eash, few fine gravel (SM) 8" up into casing after wash twice to 54' 9T tip, 3" spoon drive to 56',
60_	SPT-12	25	4-13 12-9	6"	Wet, tan GRAVEL, some sand, little silt,	medium dense	GM		
65_	- SPT-13	17	9-8 9-12	3"	Wet, tan GRAVEL, some sand, little silt,	medium dense	GM	Silty sand w	rash, little fine gravel (SM)
	SPT-14 E TYPES:	18		2"	Wet, tan GRAVEL and SAND,little silt, m		GM to SM		71', 6"recovery Approve/Date
	SPLIT SPO			Coh	o Donoitu 0.4 Variations	Cohooise Carata	. 001/	Cott	
	SPLIT SPOC TERB. TUBE			Cohesionles 5-9 Lo		Cohesive Consistency 3-4 Soft, 5-8 M/St	_		
RUN=R	OCK CORE	mo	stly >50%	30-49	Dense 50+ Very Dense	16-30 V-Stiff, 3	1+ Hard		



PROJ	JECT: Ma	ssDOT	Silver Line E	xtension					SHE	ET	BORING NO.
SITE	LOCATION				JOB 1	NO.: 60242256			4 o	f 4	B-28
	MB	TA Righ	t of Way		LOCA				Elevation	on:	Total Depth:
		Chelsea	, MA		N	2969288	E 7	82872	10	.5'	71.0'
Dept (ft)		N Value	Blow Count (per 6 in.)	Sample Recovery (inches)			AMPLE CRIPTION		ASTM Class.		REMARKS
71	SPT-14	18	10-11	2"	We	t, tan GRAVEL and S	AND, little silt, n	nedium dense	GM to SM	3" spoon	to 71', 6" recovery
75					End	d of Boring @ 71.0' bg	s			bentonite from 0' to	e and cement Grout placed o 71' bgs
75_					-						
80_					-						
85_					-						
90_					-						
					-						
SAMP	LE TYPES:	trad	ce 0 to 5%			S	PT Resistanc	e.			Approve/Date
	LE TTPES. 2" SPLIT SPO						i i itosisialio				Approve/Date
	B" SPLIT SPO			Cohesionles	ss Density	/: 0-4 Very Loose		Cohesive Consistency	<u>v</u> 0-2 Ver	y Soft	
	STERB. TUBI		ne 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/S	tiff, 9-15 S	Stiff	
RUN=	ROCK CORE	mo	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 3	1+ Hard		



SITE LOCATION: JOB NO.: 60242256 1 of 4 B-2 MBTA Right of Way LOCATION: Elevation: Total Depth Chelsea, MA N 2969308 E 782794 10.7' 71.	n:
Chelsea, MA N 2969308 E 782794 10.7' 71.	0'
	.0
DRILL CONTRACTOR: Northern Drill Service ENG: William Checchi BEGUN: 1/15/2	2014
DRILL RIG: ATV Mobile B-48, Auto Hammer DRILLER: Tim Tucker FINISHED: 1/16/2	2014
Hole Size : Ground Water (Depth/Elev.) :	
HW Casing - 4" ID 01/15/14 clear 40 F, 01/16/14 cloudy 36 F 9' bgs (1/16/14)	
Drilling Method : Top of Rock (Depth) :	
Rotary Wash with Roller Bit Water Not Encountered	
Depth (ft) Sample (per 6 in.) Sample Recovery (inches) SAMPLE DESCRIPTION ASTM Class.	(S
Dry, roadbed ballast stone and black GRAVEL and SAND, GM to SM Air Knife to 6'bgs (1/14/1	14)
SM S	
Bulk	
Sample	
Dry, tan GRAVEL and SAND, few silt GW to SW	
5	
Silty sand wash, some file	ine gravel
Wet, tan GRAVEL and SAND, few silt, medium dense GW to	
SPT-1 24 10-13 10" SW	
11-12	
water at 9' bgs inside 59 (1/16/14)	9' of HW casing
Wet, tan SAND, some gravel, few silt, medium dense SW	
SPT-2 17 7-8 10"	
9-8	
Silty sand wash, some fit	ine aravel
Siny cand main, conne in	mo gravor
Wet, tan SAND, some gravel, few silt, medium dense	
15 SPT-3 16 7-8 10" Wet, all 67 lb, some grave, low sin, median delise SW gravel in SPT tip	
8-7	
Silty sand wash, some file	ine gravel
	24'
SPT-4 15 5-7 0" Wet, tan SAND, some gravel, few silt, medium dense SW 3" spoon pushed 19' to 2	21,
	ove/Date
SPT=2" SPLIT SPOON few 5 to 10% Sex 25" SPLIT SPOON little 15 to 25" (Sex 25" SPLIT SPOON little 15 to 25" SPLIT SPOON little 15 to 25" (Sex 25" SPLIT SPOON little 15 to 25" SPLIT SPOON little 15 to 25" (Sex 25" SPLIT SPOON little 15 to 25" SPLIT SPOON little 15 to 25" (Sex 25" SPLIT SPOON little 15 to 25" SPLIT SPOON little 15 to 25" (Sex 25	
SS3=3" SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft OT=OSTERB. TUBE some 30 to 45% 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	
RUN=ROCK CORE mostly >50% 30-49 Dense 50+ Very Dense 16-30 V-Stiff, 31+ Hard	



PROJE	CT: Ma	ssDOT S	Silver Line E	xtension			SHE	ET	BORING NO.
SITE I	OCATION:				JOB NO.: 60242256		2 0		
	MB	ΓA Right	of Way		LOCATION:		Elevation	on: To	tal Depth:
	(Chelsea	, MA	ı	N 2969308 E 7	782794	10	.7'	71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS
	SPT-4	15	8-9	0	Wet, tan SAND, some gravel, few silt, m	nedium dense	SW	10" recover	shed 19' to 21', V %, sand 54.2%,
25	SPT-5	21	8-12 9-10	0	Wet, tan SAND, some gravel, few silt, m	nedium dense	sw	3" spoon pu 10" recover	shed 24' to 26', V
_			4-3		Wet, tan GRAVEL, some sand, few silt,	loose	GW	(SM) 3" spoon pu	ash, some fine gravel
30	SPT-6	6	3-5	0			GW	6" recovery Silty sand w (SM)	ash, some fine gravel
35	- SPT-7	12	7-7 5-3	0	No Recovery			3" spoon pu no recovery	
<u>-</u>								Silty sand w (SM)	rash, some fine gravel
40	SPT-8	6	3-3 3-3	0	No Recovery		GW	recovered of in SPT-8	nly angular "wash" gravel
								Silty sand w	rash, some fine gravel
45	SPT-9	14	7-8	4"	Wet, tan SAND, little gravel, few silt, me	edium dense	SW		
	E TYPES:	trac			SPT Resistan	ce			Approve/Date
	SPLIT SPO			Cohorinal	Depoits 0.4 New !	Cohooiya Caraist		n. Coff	
	SPLIT SPOO TERB. TUBE		e 15 to 25% ne 30 to 45%	Cohesionles 5-9 Lo		Cohesive Consistency 3-4 Soft, 5-8 M/S	_		
	OCK CORE				Dense 50+ Very Dense	16-30 V-Stiff, 3		2011	



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension			SHEET	BORING NO.	
SITE I	OCATION:				JOB NO.: 60242256		3 of 4	B-28A	
	MB	ΓA Right	of Way		LOCATION:	Ele	evation:	Total Depth:	
	(Chelsea	MA		N 2969308 E 78	32794	10.7'	71.0'	
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		STM ass.	REMARKS	
	SPT-9	14	6-6	4"	Wet, tan SAND, little gravel, few silt, med	lium dense S		and wash, some fine gravel	
50_	- SPT-10	12	7-7 5-6	4"	Wet, GRAVEL, trace sand and silt, medic	ım dense G	(SM) GW	in SPT tip	
 -							Silty s	and wash, few fine gravel (SM)	
55	SPT-11	7	2-3 4-5	5"	Wet, GRAVEL, trace sand and silt, loose	G	SW		
_							Silty s	and wash, few fine gravel (SM)	
60	SPT-12	53	9-30 23-12	4"	Wet, tan GRAVEL, little sand, few silt, ve	ery dense G	GW gravel	in SPT tip	
_							grave	lly wash	
65	SPT-13	7	7-4 3-4	6"	Wet, tan GRAVEL and SAND, few silt, lo		N to gravel	in SPT tip	
							Silty si (SM)	and wash, some fine gravel	
70	SPT-14	9	5-6	3"	Wet, tan GRAVEL and SAND, few silt, lo			on pushed to 71',	
	E TYPES:	trac	e 0 to 5%		SPT Resistanc		SW no recovery Appro		
SPT=2"	SPLIT SPO	ON few	5 to 10%						
	SPLIT SPOO			Cohesionles	· · · · · · · · · · · · · · · · · · ·	Cohesive Consistency 0-	•		
	TERB. TUBE OCK CORE			5-9 Lo 30-49 I		3-4 Soft, 5-8 M/Stiff, 9 16-30 V-Stiff, 31+ H			
	JOIN JOINE	1110	July 20070	30-481	Solido Soli vely Delise	10-00 v-0till, 31+ F	iaiu		



PRO	IECT: Ma	ssDOT \$	Silver Line E	xtension					SHE	ET	BORING NO.
SITE	LOCATION:				JOB	NO.: 60242256	3		4 o	f 4	B-28A
	MB ⁻	TA Right	t of Way		LOC	ATION:			Elevation	on:	Total Depth:
	1	Chelsea	, MA		1	1 2969308	E 7	82794	10	.7'	71.0'
Dept (ft)	h Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)			AMPLE CRIPTION		ASTM Class.		REMARKS
71	SPT-14	9	3-3	3"	V	et, tan GRAVEL and S	AND, few silt, lo	oose	GW to SW	3" spoon no recovi	pushed to 71', ery
75				E	nd of Boring @ 71.0' bo	ıs			bentonite from 0' to	and cement Grout placed 71' bgs	
					-						
80_					-						
85_					-						
90_					-						
04::=	 	<u> </u>	0::				DT D		<u> </u>	[A
	LE TYPES: 2" SPLIT SPO	trac ON few				S	PT Resistanc	e			Approve/Date
	SPLIT SPO			Cohesionles	nless Density: 0-4 Very Loose Cohesive Con:			Cohesive Consistency	ve Consistency 0-2 Very Soft		_
	STERB. TUBE		ne 30 to 45%		sionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff						
	ROCK CORE				Dense	50+ Very Dense		16-30 V-Stiff, 31			



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension	n				EET	BORING NO.	
SITE L	OCATION:				JOB NO.: 60242256				f 4	B-29	
	MB	ΓA Right	of Way		LC	CATION:		Elevation	on: To	tal Depth:	
	(Chelsea,	MA			N 2969321 E 782715	;	10.	.2'	71.0'	
	CONTRAC	TOR :	Northern Dri	Il Service	ΕN	IG: William Checchi		BEGUN		1/24/2014	
DRILL		TV Mobil	e B-48, Auto I	Hammer	DF	RILLER: Tim Tucker		FINISHED: 1/27/2014			
Hole Si			Weather:					ater (Depth/Elev.) :			
	Casing - 4	" ID		01/24/14		ar 10 F; 01/27/14 cloudy 35 F			sing (1/27/14)		
Drilling	Method :				Drilling Fluid : Top of Rock				•		
	Rotary \	Nash wi	th Roller Bit	1		Water		No	ot Encoun	tered	
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS	
						Dry, roadbed ballast stone and black GRAVEL little silt	and SAND,	GM to SM			
	Air							Oivi			
	Knife 1/14/14					Dry, tan GRAVEL and SAND, little silt		GM to SM			
						Moist, olive CLAY, trace silt, stiff		CL			
5	SPT-1	13	9-6	12"		Woist, onve CLAT, trace siit, stiii		OL.			
			7-10								
									Silty clayey little gravel	SAND wash, ISMI	
										,	
					-						
						Wet, GRAVEL, olive clay on gravel, medium de	ense		water at 9'	ogs inside 54' of HW casing	
10	SPT-2	28	7-15	3"					(1/27/14)		
			13-12		_						
									Silty sand u	vash, some gravel [SM]	
									Only Sand V	rasii, some graver towi	
					-	Wet, light brown SAND, some gravel, little silt, ı	medium	SM		, pushed 3" spoon	
15	SPT-3	22	11-12	0		dense			from 14' to 3" recovery		
			10-10								
									Silty sand v	vash, some gravel [SM]	
									Janey Saina V	, some graver town	
					1						
	SPT-4	15	13-8	10"	Wet, light brown SAND, some gravel, few silt, medium						
20				10	dense			SW		Approve/Date	
SAMPLE TYPES: trace 0 to 5% SPT=2" SPLIT SPOON few 5 to 10%						SPT Resistance				Approve/Date	
	SPLIT SPO			Cohesionles	ss D	ensity: 0-4 Very Loose Cohesi	ve Consistency	0-2 Ver	y Soft		
	ERB. TUBE						Soft, 5-8 M/St		Stiff		
RUN=R	OCK CORE	mos	stly >50%	30-49	49 Dense 50+ Very Dense 16-30 V-Stiff, 31+ Hard						



PROJ	ECT: Mas	ssDOT S	Silver Line E	xtension		SHEET		BORING NO.	
SITE	LOCATION:				JOB NO.: 60242256		2 0	f 4	B-29
	MB	TA Right	of Way		LOCATION:		Elevation	on: To	otal Depth:
	(Chelsea,	MA		N 2969321	E 782715	10	.2'	71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMP DESCRIF		ASTM Class.		REMARKS
	SPT-4	15	7-7	10"	Wet, light brown SAND, some dense	gravel, few silt, medium	SW		
-								Silty sand v	vash, some fine gravel [SM]
25	CDT 5	24	8-10	4.4"	Moist, brown SAND, few grave	l, trace silt, medium dens	e SW		
	SPT-5	21	11-12	14"					
-								Silty sand v (SM)	vash, some fine gravel
30	ODT 0	00	16-13	40"	Moist, tan SAND, some gravel	, few silt, medium dense	SW		
	SPT-6	26	13-10	12"				Silty sand v	vash, some fine gravel
35_	SPT-7	14	11-7 7-10	- 18"	Wet, tan SAND, some gravel, dense	few silt and clay, medium	sw	(SM)	
-								Silty sand v (SM)	vash, some fine gravel
40_	SPT-8	15	8-8	12"	Wet, tan SAND, some gravel, dense	little silt, trace clay, mediu	m SW		
	GI 1 0	10	7-7	12					
45	SPT-9	28	11-12	22"	Moist, tan SAND, little silt and		SC - SM		
	E TYPES:	trac			SPT I	Resistance			Approve/Date
SPT=2" SPLIT SPOON few 5 to 10% SS3=3" SPLIT SPOON little 15 to 25% Cohesionless					s Density: 0-4 Very Loose	Cohesive Consis	tency 0-2 Ver	y Soft	
OT=OS	STERB. TUBE	som			5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff				
RUN=F					Dense 50+ Very Dense	16-30 V-Stiff	f, 31+ Hard		



PROJE	CT: Mas	SSDOT S	Silver Line E	xtension		SHE	EET BORING NO.	
SITE I	OCATION:				JOB NO.: 60242256	3 о	of 4 B-29	
	MBT	ΓA Right	of Way		LOCATION:	Elevation	on: Total Depth:	
	(Chelsea,	MA		N 2969321 E 782715	10	0.2' 71.0'	
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION	ASTM Class.	REMARKS	
	SPT-9	28	16-13	22"	Moist, light gray CLAY, very stiff	CL		
50			6-6		Dry, light gray CLAY, silt and fine sand lenses, stiff	CL		
	SPT-10	11	5-9	24"			CLAY and silty sand wash	
55	- SPT-11	21	8-9 12-12	16"	Moist, stratified light gray CLAY, very stiff, and tan medium to fine SAND, few silt, medium dense	CL and SM	CLAY and silty sand wash	
60_	SPT-12	33	15-13	12"	Moist, olive CLAY, hard	CL	gravel driven thru SPT sample silty sand came into casing, to 56',	
_			20-15				after SPT-12 drive gravel and silt in SAND wash [SM]	
65	SPT				NO SAMPLE - miscount on drill rods during rotary washout from 59'		gravel and silt in SAND wash [SM]	
70	SPT-13	16	11-8	4"	Wet, olive SAND, little gravel and silt, medium dense	SM	3" spoon to 71', 6" recovery	
SAMPLE TYPES: trace 0 to 5% SPT=2" SPLIT SPOON few 5 to 10%					SPT Resistance		Approve/Date	
SS3=3"	SPLIT SPOO	ON little	15 to 25%			_		
					5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff 30-49 Dense 50+ Very Dense 16-30 V-Stiff, 31+ Hard			



PROJ	ECT:	MassDOT	Silver Line E	Extension					EET	BORING NO.
SITE	LOCATI	ON:			JOB NO.: 60242256				f 4	B-29
		MBTA Rig	ht of Way		LO	CATION:		Elevation	on:	Total Depth:
		Chelse	a, MA			N 2969321 E 7	'82715	10	.2'	71.0'
Depth (ft)	Samı		Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
71	SPT-	13 16	8-8	4"	,	Wet, olive SAND, little gravel and silt, me	edium dense	SM		
75						End of Boring @ 71.0' bgs			35' and 50	ig broke off at D', all casing was retrieved and cement Grout placed 71' bgs
80										
85										
90										
SAMPI	_E TYPE	S: tr	ace 0 to 5%		SPT Resistance					Approve/Date
	SPT=2" SPLIT SPOON few 5 to 10%									
	SS3=3" SPLIT SPOON little 15 to 25% <u>Cohesionle</u> OT=OSTERB. TUBE some 30 to 45% 5-9 I									
			ome 30 to 45%	5-9 Lo 30-49		10-29 Med. Dense 50+ Very Dense	3-4 Soft, 5-8 M/Si 16-30 V-Stiff, 3		Stiff	
. VOIN-I						OUT VELY DELISE	10-30 V-3111, 3	ir iidiu		



PROJE	ECT: Mas	ssDOT S	Silver Line E	xtension				SHEET		BORING NO.
SITE I	LOCATION:				JO	B NO.: 60242256	1 of 1			B-30
	MB	ΓΑ Right	of Way		LO	CATION:		Elevation	on: To	tal Depth:
	(Chelsea,	MA			N 2969338 E 78266	0	10	.2	12.0
DRILL	CONTRAC	TOR:	Northern Dri	II Service	EN	G: William Checchi		BEGUN	۷:	1/31/2014
DRILL	RIG:	ATV Mobi	le B48, Auto F	lammer	DR	ILLER: Tim Tucker		FINISHED: 1/31/2014		
Hole S	ize :		Weather:				Ground Wa	ater (Dep	oth/Elev.)	
	3.25" ID				1/31/14 cloudy 40 F)' bgs (1/3	1/14)
Drilling	Method :				Dri	lling Fluid :	Top of Roc	k (Depth	n) :	
	Holl	ow Sten	n Auger			None		No	ot Encount	tered
Depth (ft)						SAMPLE DESCRIPTION				REMARKS
						Dry, black GRAVEL and SAND, little silt			Air Knife to	4' bgs (1/14/14)
	Bulk Sample					FILL		GM to SM	water at 3' (Moisture co gravel 46.8' fines 16.5%	ntent 9.5% %, sand 36.7%
5					-	Wet, tan SAND, little gravel and clay, few silt,	medium	SC	gravelly sar	nd auger spoil
	SPT-1	29	4-14 15-12	5"		dense			Auger plug	dry at 6' bgs
_										nd auger spoil
10									Auger plug	wet at 9' bgs
	ODT 0	0.4	4-16	4.411		Wet, tan SAND, little gravel and clay, few silt,	dense	SC		
	SPT-2	31	15-6	14"		Moist, olive clay, very stiff		CL		
_			13-0			End of Boring @ 12.0' bgs				
15										
 - -					-					
	SAMPLE TYPES: trace 0 to 5%					SPT Resistance			l	Approve/Date
						-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff				
KUN=R	OCK CORE	mos	stly >50%	30-49	Dense 50+ Very Dense 16-30 V-Stiff, 31+ Hai					



PROJE	CI: Mas	SSDOT S	Silver Line E	xtension				SHE	EI	BORING NO.	
SITE L	OCATION:				JO	B NO.: 60242256		1 of	4	B-30A	
	MBT	ΓA Right	of Way		LC	CATION:		Elevation	n: To	tal Depth:	
	(Chelsea	, MA			N 2969359 E 7825	585	9.8	3'	71.0'	
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	ΕN	IG: William Checchi		BEGUN	l:	1/27/2014	
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DF	RILLER: Tim Tucker		FINISH	ED :	1/28/2014	
Hole Siz	ze:		Weather:				Ground Wa	ater (Dep	th/Elev.)		
HW	Casing - 4	" ID		01/27/14	clou	dy 30 F; 01/28/14 cloudy 15 F	N	Measured @ 5.6 bgs (1/30/14)			
Drilling	Method :				Dr	lling Fluid :	k (Depth):				
	Rotary \	Nash wi	th Roller Bit			Water		No	t Encoun	tered	
Depth	Sample	N	Blow Count	Sample		SAMPLE		ASTM		REMARKS	
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)		DESCRIPTION		Class.			
				(Inches)							
						Dry, roadbed ballast stone and black GRAVE little silt	EL and SAND,				
						nuie siit		GM to			
	Air					FILL		SM			
	Knife 1/14/14										
	1/14/14					Moist, tan GRAVEL and SAND, little clay, fe	w silt				
5						most, tan Grotte and Gritts, made day, to	··· Oilt	GC to			
								SC			
			0.4		3333333	Moist, olive CLAY, trace gravel, sand and sil	t, stiff	CL			
	SPT-1	11	3-4	10"							
			7-13								
10			0 11			Moist, tan CLAY, trace gravel, sand, and silt	, very stiff	CL			
10_	SPT-2	23	8-11	6"							
			12-19		-						
									Silty sand w	vash, little gravel	
					_						
					_	Wet, tan stratified SAND, little gravel, and m	edium to fine	SW to			
15	SPT-3	27	10-11	16"		sand, little silt, medium dense	calain to line	SM			
	0		16-15								
					_				Silty sand w	ash, some gravel	
20	SPT-4	25	10-10	12"		Wet, tan stratified SAND, little gravel, and m	edium to fine	SW to			
	TYPES:	trac	e 0 to 5%			SAND, little silt, medium dense SPT Resistance		SM		Approve/Date	
	SPLIT SPO					5				pp. 070, Date	
	SPLIT SPOC			Cohesionles	ss D	ensity: 0-4 Very Loose Coh	nesive Consistency	/ 0-2 Very	y Soft		
OT=OST	ERB. TUBE	son	ne 30 to 45%	5-9 Lo	Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/St				tiff		
RUN=RC	OCK CORE	mos	stly >50%	30-49	0-49 Dense 50+ Very Dense 16-30 V-Stiff, 31+ Hard						



PROJI	ECT: Ma	ssDOT S	Silver Line E	xtension		SHEET	BORING NO.
SITE	LOCATION:				JOB NO.: 60242256	2 of 4	B-30A
	MB ⁻	TA Right	of Way		LOCATION:	Elevation:	Total Depth:
	(Chelsea	, MA		N 2969359 E 782585	9.8'	71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION	ASTM Class.	REMARKS
	SPT-4	25	15-18	12'	Wet, tan stratified SAND, little gravel, and medium to fine SAND, little silt, medium dense	SW to SM	
25	SPT-5	42	22-15 27-32	12"	Wet, light gray SAND, little gravel and clay, few silt, dense	e SC	
30	SPT-6	87	12-57 30-21	6"	Moist, light gray GRAVEL and SAND, few silt, trace clay, very dense	GW to	
35	SPT-7	55	15-27 28-18	12"	Wet, light gray GRAVEL and SAND, few silt and clay, very dense	GW to	
40	- SPT-8	49	42-29 20-19	3"	Wet, light gray GRAVEL and SAND, little clay, few silt, dense	GC to SC	
	SPT-9 E TYPES:	17 trac		24	Moist, light gray CLAY, very stiff SPT Resistance	CL	Approve/Date
	SPLIT SPO			Cohesionles	s Density: 0-4 Very Loose Cohesive Consiste	ncy 0-2 Very Soft	
	TERB. TUBE		ne 30 to 45%			V/Stiff, 9-15 Stiff	
KUN=k	OCK CORE	mos	stly >50%	30-49	Dense 50+ Very Dense 16-30 V-Stiff,	31+ Hard	



PROJE	ECT: Mas	ssDOT S	Silve Line Ex	ctension		SHE	ET BORING NO.
SITE I	LOCATION:				JOB NO.: 60242256	3 of	4 B-30A
	MBT	ΓA Right	of Way		LOCATION:	Elevation	on: Total Depth:
	(Chelsea	MA		N 2969359 E 782585	9.8	3' 71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION	ASTM Class.	REMARKS
_	SPT-9	17	9-10	24"	Moist, light gray CLAY, very stiff	CL	
50	SPT-10	40	13-19 21-17	10"	Moist, light gray CLAY, hard	CL	gravel driven thru SPT sample
55	SPT-11	62	40-35 27-31	18"	Dry, light gray CLAY, hard Wet, tan medium to fine SAND, little silt, dense	CL	
60_	SPT-12	20	11-10	10"	. Wet, light brown SAND, little silt, medium dense	SM	
65_	SPT-13	31	12-15 16-23	14"	Wet, tan to olive fine SAND, little silt, dense	SM	
SPT=2"	SPT-14 E TYPES: 'SPLIT SPOO		5 to 10%	24" Cohesionles	Dry, gray-tan CLAY, fine sand lenses, hard SPT Resistance s Density: 0-4 Very Loose Cohesive Cor	CL CL	Approve/Date
	TERB. TUBE					5-8 M/Stiff, 9-15 S	
RUN=R					Dense 50+ Very Dense 16-30 V-5		



PRO	JEC	CT: Mas	sDOT S	Silver Line E	xtension					SHE	ET	BORING NO.
SITE	LC	OCATION:					B NO.: 6024225	6		4 0	f 4	B-30A
		MBT	A Right	of Way		LC	CATION:			Elevation	on:	Total Depth:
			Chelsea				N 2969359	E 7	82585	9.	8'	71.0'
				,			11 200000					
Dept	th	Sample	Ν	Blow Count	Sample		;	SAMPLE		ASTM		REMARKS
(ft)		Type/No.	Value	(per 6 in.)	Recovery		DES	SCRIPTION		Class.		T(LIVI) (IT(IO
					(inches)							
71		SPT-14	39	23-25	24"		Dry, gray-tan CLAY, fine	e sand lenses, ha	ard	CL		
	-						End of Boring @ 71.0' b	gs				
												e and cement Grout placed to 71' bgs (12/28/14)
75												
_											bent	PVC well screen set from 10' to 20' bgs, onite seal from 3' to 4' bgs (1/29/14)
												(1/25/14)
80												
						1						
						-						
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85												
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	\vdash					-						
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90_	H											
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	Ш											
	П					1						
	H					1						
0411		TVD50	I.	. 0: 50:				ODT Desists				A ====== /D=1
		TYPES: SPLIT SPOC	trac N few				· · · · · · · · · · · · · · · · · · ·	SPT Resistand	ce			Approve/Date
		SPLIT SPOO			Cohesionles	ss D	ensity: 0-4 Very Loose		Cohesive Consistency	y 0-2 Ver	ry Soft	
		ERB. TUBE		ne 30 to 45%			10-29 Med. Dens	е	3-4 Soft, 5-8 M/S	-	-	
RUN=	RO	OCK CORE	mos	stly >50%	30-49	Den	se 50+ Very Dense		16-30 V-Stiff, 3	1+ Hard		



PROJE	CT: Mas	SSDOT S	Silver Line E	xtension	n				ET	BORING NO.	
SITE L	OCATION:				JO	B NO.: 60242256		1 of	f 4	B-31	
	MB	ΓA Right	of Way		LO	CATION:		Elevation	on: To	otal Depth:	
		Chelsea,	MA			N 2969377 E 782517		9.:	2'	71.0'	
DRILL	CONTRAC	TOR:	Northern Dri	II Service	ΕN	IG: William Checchi		BEGUN	N:	1/29/2014	
DRILL	RIG: A	TV Mobil	e B-48, Auto H	Hammer	DR	RILLER: Tim Tucker		FINISHED: 1/30/2014			
Hole Si	ize :		Weather:				Ground Wa	ter (Depth/Elev.) :			
HW	/ Casing - 4	" ID		01/29/14	4 cloudy 15 F; 01/30/14 clear 15 F				5.6 bgs (1/29/14)		
Drilling	Method:	•			Dri	lling Fluid :	Top of Rocl	k (Depth	n) :		
	Rotary \	Nash wi	th Roller Bit			Water		No	ot Encoun	tered	
Depth (ft)	· ·				SAMPLE DESCRIPTION			ASTM Class.		REMARKS	
						Dry, roadbed ballast stone and black GRAVEL a few silt	and SAND,	GM to	Air Knife to	4.6' bgs (1/14/14)	
	DITT					FILL		SM	HAZMAT S	SAMPLE	
	BULK SAMPLE					Dry, tan medium to fine SAND, some gravel, litt	e clay	SC			
							•		HAZMAT S	SAMPLE	
					_	Dry, tan medium to fine SAND, little clay, mediu	ım dense		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	, <u>2</u> 2	
5	SPT-1	10	5-4	18"		, ,,		SC			
			6-6			Moist, tan CLAY, trace fine sand and silt, stiff		CL			
									Roller bit th	nru gravels	
						Dry, tan CLAY, trace gravel, sand, and silt, stiff			Roller bit o	pen hole and sample before	
10	SPT-2	20	9-10	12"				CL	advancing		
			10-14								
									sand, and f	ine gravel in CLAY wash	
						Dry, tan, stratified CLAY, few fine gravel and sa	nd vorv etiff	CL to	Roller hit o	pen hole and sample before	
15	SPT-3	30	11-11	22"		and medium to fine SAND, little clay, dense	na, very still,	SC	Tronor bit of	son note and sample solote	
			19-25								
-					-						
					-	Dry ton modium to fine CAND trace arrest and	olov				
20 SPT-4 21 10-10 16"						Dry, tan medium to fine SAND, trace gravel and clay, medium dense					
SAMPLE TYPES: trace 0 to 5%					SPT Resistance					Approve/Date	
	SPT=2" SPLIT SPOON few 5 to 10% SS3=3" SPLIT SPOON little 15 to 25% Cohecients					less Density: 0.4 Very Losse Cohesiya Consistency			v Coff	-	
	SS3=3" SPLIT SPOON little 15 to 25% Cohesionle DT=OSTERB. TUBE some 30 to 45% 5-9 L					ionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft -9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff					
						30-49 Dense 50+ Very Dense 16-30 V-Stiff, 31+ Hard					



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension)			SHE	EET	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		2 o	f 4	B-31
	MB	ΓA Right	of Way		LO	CATION:		Elevation	on: T	otal Depth:
	(Chelsea	, MA			N 2969377 E 7	82517	9.	2'	71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
	SPT-4	21	11-12	16"		Dry, tan medium to fine SAND, trace gramedium dense	vel and clay,	SP	Roller bit advancing	open hole and sample before g casing
25	SPT-5	18	9-9 9-10	15"		Dry, tan medium to fine SAND, trace gramedium dense	vel and clay,	SP	Casing at Roller bit	24' bgs open hole from 24' to 69' bgs
30	SPT-6	23	9-12 11-16	14"		Dry, light brown medium to fine SAND, tr clay, medium dense Dry, light brown CLAY, trace gravel, sand	-	SP CL		
35	SPT-7	33	12-15 18-19	10"		Moist, brown gray CLAY, trace gravel, sa	and, and silt, hard	CL	gravel, sa	nd, and silt in CLAY wash
40	SPT-8	37	15-17 20-20	18"		Moist,stratified red coarse SAND, to light fine SAND, trace silt, dense	brown coarse to	SP	Roller bit	thru gravels
	SPT-9 : TYPES:	42 trac		18"		Wet, stratified medium to fine SAND, little coarse to fine sand, trace silt, dense SPT Resistand		SM to SW		Approve/Date
OT=OST	SPLIT SPOO ERB. TUBE OCK CORE	son	ne 30 to 45%	Cohesionle: 5-9 Lo 30-49	oose	10-29 Med. Dense	Cohesive Consistency 3-4 Soft, 5-8 M/St 16-30 V-Stiff, 3	tiff, 9-15 S		



PROJE	CT: Mas	SSDOT S	Silver Line E	xtension					SHE	ET	BORING NO.
SITE I	OCATION:					NO.: 60242256	<u> </u>		3 of	f 4	B-31
	MB1	ΓA Right	of Way		LOC	ATION:			Elevation	on: T	otal Depth:
	(Chelsea,	, MA		N	1 2969377	E 7	82517	9.:	2'	71.0'
Depth	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery			AMPLE CRIPTION		ASTM Class.	1	REMARKS
. ,	7.		, ,	(inches)							
	SPT-9	42	23-23	18"		et, stratified medium to parse to find sand, trace		e silt, and red	SM to SW	SAND wa	sh
										gravel and	d sand in CLAY wash
50	SPT-10	31	20-18 13-36	12"	N	oist, olive to light gray (CLAY, trace gra	vel and sand, hard	CL		
55	- SPT-11	19	9-10 9-9	24'	M	oist, light gray CLAY, v	ery stiff		CL		
60_	SPT-12	15	4-6 9-10	24"	M	oist, light gray CLAY, s	tiff		CL	Roller bit t	thru gravel
65	- SPT-13	24	7-11 14-17	24"	D	ry, light gray CLAY, ver	y stiff		CL		
70	SPT-14	35	23-22	16"	N	oist, light gray CLAY, fi			CL	Roller bit i	thru gravel
	E TYPES:	trac				S	PT Resistanc	e			Approve/Date
SS3=3"	SPLIT SPOO SPLIT SPOO TERB. TUBE	ON little		Cohesionles		0-4 Very Loose 10-29 Med. Dense		Cohesive Consistency 3-4 Soft, 5-8 M/Si	-	-	
≀UN=R	OCK CORE	mos	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 3	1+ Hard		



PRO	JECT: Ma	ssDOT \$	Silver Line E	xtension					SHE	EET	BORING NO.
SITE	LOCATION				JOB N	IO.: 60242256			4 0	f 4	B-31
	MB	TA Right	t of Way		LOCA				Elevation	on: T	otal Depth:
		Chelsea	, MA		N :	2969377	E 7	82517	9.	2'	71.0'
Dept	h Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)			AMPLE CRIPTION		ASTM Class.		REMARKS
71	SPT-14	35	13-11	16"	Moi	st, light gray CLAY, fi	ne sand lenses,	hard	CL		
75_					End	of Boring @ 71.0' bξ	gs			bentonite a	and cement Grout placed 71' bgs
80_					-						
85_					- - -						
90_					-						
					-						
SAMP	LE TYPES:	trac	e 0 to 5%			S	PT Resistance	ce	<u> </u>		Approve/Date
	2" SPLIT SPO					_		T			
	B" SPLIT SPO				-			Cohesive Consistency	_		
	STERB. TUBI		ne 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/S		Stiff	
KUN=	ROCK CORE	mo	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 3	ı+ Hard		1



PROJE	CI: Mas	SSDOT S	Silver Line E	xtension				SHE	EI	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 of	4	B-31A
	MB	ΓA Right	of Way		LC	CATION:		Elevation	n: To	otal Depth:
	(Chelsea	, MA			N 2969395 E 782450		8.8	3'	71.0'
DRILL	CONTRAC	TOR :	Northern Dri	II Service	ΕN	IG: William Checchi		BEGUN	l:	1/30/2014
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DF	RILLER: Tim Tucker		FINISH	ED:	1/31/2014
Hole Siz	ze:		Weather:				Ground Wa	ter (Dep	th/Elev.)	:
HW	Casing - 4	" ID		01/30/14	cle	ar 15 F; 01/31/14 cloudy 28 F		7.9	bgs (1/3	1/14)
Drilling	Method :				Dr	lling Fluid :	Top of Rocl	k (Depth):	
	Rotary \	Nash wi	th Roller Bit			Water		No	t Encoun	tered
Depth	Sample	N	Blow Count	Sample		SAMPLE		ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)		DESCRIPTION		Class.		
				(1 1 1)					Air Knife to	4.7' bgs (1/14/14)
						Dry, roadbed ballast stone and black GRAVEL after silt	and SAND,	GW to SW		9-()
						FILL				
						Wet, tan SAND, some gravel, few silt, dense		0)4/		
5	SPT-1	31	17-18	5"				SW		
			13-7							
									Water @ 7. inside 54' o	9' bgs 1/31/14 f casing
									1113140 04 0	casing
10			8-6			Wet, tan SAND, some gravel, few silt, medium	dense	SW		
"	SPT-2	11		8"						
			5-6							
						Wet, tan GRAVEL, some sand, few silt, mediun	n dense	GW		
15	SPT-3	26	9-13	10"						
			13-16							
20	SPT-4	41	10-16	16"		Moist, tan CLAY, trace gravel, sand, and silt, ha	rd	CL		
	TYPES:	trac	e 0 to 5%			SPT Resistance		'		Approve/Date
SPT=2"	SPLIT SPO	ON few	5 to 10%							
	SPLIT SPO			Cohesionles			ve Consistency			
	ERB. TUBE						Soft, 5-8 M/St		tiff	
INDINER(JON OURE	mos	ouy >00/0	30-49	ווטע	se 50+ Very Dense 16-	30 V-Stiff, 31	T Halu		1



PROJ	ECT: Ma	ssDOT \$	Silver Line E	xtension				SHE	ET	BORING NO.
SITE	LOCATION:				JO	B NO.: 60242256		2 0	f 4	B-31A
	MB ⁻	TA Right	of Way		LO	CATION:		Elevation	on: T	otal Depth:
	(Chelsea	, MA			N 2969395 E 7	82450	8.	8'	71.0'
Dept		N	Blow Count	Sample		SAMPLE		ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)		DESCRIPTION		Class.		
	OPT 4	44	05.00			Moist, tan CLAY, trace gravel, sand, and	silt, hard	CL		
	SPT-4	41	25-28	16"		•				
-										
•										
						Dry ton to grow CLAV ailt and fine aand	langes war stiff	CI		
25_	SPT-5	22	6-9	24"		Dry, tan to gray CLAY, silt and fine sand	ienses, very sun	CL		
	3 s		13-15							
•									Roller bit t	hru gravels 27' to 28' bgs
-										
						Moist to Wet, stratified tan SAND, little gr	ravel, dense, and	SM to		
30_	SPT-6	33	11-17	8"		tan gray CLAY, trace gravel and sand, ha	ard	CL		
			16-14							
									sand, clay	, and gravel in wash
35			11-14			Moist, olive to tan CLAY, trace gravel and	d fine sand, hard	CL		
	SPT-7	33		22"						
			19-16							
-										
						Majet to Wet stretified area CLAV trace	6	CL to		
40_	SPT-8	38	11-17	21"		Moist to Wet, stratified gray CLAY, trac and tan SAND, little silt, de		SM		
			21-22							
-										
	SPT-9	28	9-12	20"		Moist, gray CLAY, trace gravel, sand, and	d silt. verv stiff	CL		
45 SAMP	LE TYPES:	trac				SPT Resistanc		J 52	<u> </u>	Approve/Date
	LL TTFLS. 2" SPLIT SPO					OI I RESISTANCE	· <u>·</u>			/ ipplovo/Date
	" SPLIT SPO		e 15 to 25%	Cohesionles	ss De	nsity: 0-4 Very Loose	Cohesive Consistency	<u>y</u> 0-2 Ver	y Soft	7
	STERB. TUBE		ne 30 to 45%			10-29 Med. Dense	3-4 Soft, 5-8 M/S		Stiff	
KUN=I	ROCK CORE	mo	stly >50%	30-49	Dens	e 50+ Very Dense	16-30 V-Stiff, 3	1+ Hard		



PROJE	ECT: Mas	ssDOT S	Silver Line E	xtension		SHE	EET BORING NO.
SITE I	LOCATION:				JOB NO.: 60242256	3 o	f 4 B-31A
	MBT	ΓA Right	of Way		LOCATION:	Elevation	on: Total Depth:
	(Chelsea	, MA		N 2969395 E 782450	8.	8' 71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery	SAMPLE DESCRIPTION	ASTM Class.	REMARKS
				(inches)			
	SPT-9	28	16-17	24"	Moist gray CLAY, trace gravel, sand, and silt, very s	stiff CL	
50_	SPT-10	33	10-14 19-24	8"	Moist, gray CLAY, trace gravel and sand, hard	CL	
55	- SPT-11	27	8-12 15-19	12"	Moist, gray CLAY, trace gravel and sand, very stiff	CL	
60_	SPT-12	14	3-6 8-11	24"	Moist, gray CLAY, trace gravel and sand, stiff	CL	
65_	SPT-13	13	2-6	24"	Moist, gray CLAY, trace gravel and sand, stiff	CL	
	OT-1		7-8 Hyd push	0			Osterberg tube did not advance, bottom of tube damaged on small gravels
70	SPT-14	13	5-5	24"	Moist, gray stratified fine SAND, few silt, medium de and CLAY, stiff	ense, SP to CL	
	E TYPES:	trac			SPT Resistance		Approve/Date
	SPLIT SPOO			Cohesionlos	s Density: 0-4 Very Loose Cohesive C	onsistency 0-2 Ver	ov Soft
	SPLIT SPOC STERB. TUBE		ne 30 to 45%			onsistency 0-2 ver 5, 5-8 M/Stiff, 9-15 S	
	OCK CORE			30-49		/-Stiff, 31+ Hard	



PRO	JECT: Ma	ssDOT	Silver Line E	xtension					SHE	ET	BORING NO.
SITE	LOCATION					NO.: 60242256			4 of	f 4	B-31A
	ME	TA Righ	t of Way		LOC	ATION:			Elevation	on:	Total Depth:
		Chelsea	, MA		ı	1 2969395	E 78	2450	8.	8'	71.0'
Dept		N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION	N		ASTM Class.	•	REMARKS
71	SPT-14	13	8-15	24"	N	loist, gray CLAY, stiff			CL		
75_					E	nd of Boring @ 71.0' bgs				bentonite from 0' to	and cement Grout placed 71' bgs
80_					-						
85_					- - -						
90_					-						
					- - -						
SAMF	PLE TYPES:	trac	ce 0 to 5%			SPT Resis	stance	ļ	•	•	Approve/Date
SPT=	2" SPLIT SPC	ON few									
	3" SPLIT SPC						C	Cohesive Consistency	•		
	STERB. TUB		ne 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/St		Stiff	
KUN=	ROCK CORE	mo	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 31	ı+ Hard		_1



PROJE	CI: Mas	ssDOT S	Silve Lline E	xtension				SHE	EI	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 of	1	B-32
	MB	ΓA Right	t of Way		LO	CATION:		Elevation	on: To	otal Depth:
	(Chelsea	, MA			N 2969416 E 782376	;	8.	2	12.0
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	ΕN	IG: William Checchi		BEGUN	1:	1/31/2014
DRILL	RIG:	ATV Mob	ile B48, Auto H	lammer	DF	RILLER: Tim Tucker		FINISH	ED :	1/31/2014
Hole Siz	ze:		Weather:				Ground Wa	ter (Dep	th/Elev.)	:
	3.25" ID				1	/31/14 cloudy 40 F		9.0)' bgs (1/3	1/14)
Drilling	Method :		!		Dri	lling Fluid :	Top of Rocl	k (Depth	ı) :	
	Holl	low Sten	n Auger			None		No	t Encoun	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
						Dry, black GRAVEL and SAND, few silt		GP to SW	Air Knife to	4' bgs (1/14/14)
	Bulk					Dry, tan SAND, some gravel, few silt		SW	Hazmat sar	nple
	Sample								Hazmat sar	nple
5									gravel and	sand auger spoil
					-					
	SPT-1	44	6-17	8"		Dry, tan GRAVEL and SAND, few silt and clay,	dense	GW to	Auger plug	dry at 6' bgs
			27-29					SVV		
									gravelly sai	nd auger spoil
10									Auger plug	wet at 9' bgs
	SPT-2	11	4-6	5"		Wet, tan GRAVEL and fine SAND, few silt, med	dium dense	GW to SW		
			5-4							
						End of Boring @ 12.0' bgs				
_					_					
15										
					1					
					1					
_					1					
SAMPLE	TYPES:	trac	ce 0 to 5%			SPT Resistance				Approve/Date
SPT=2"	SPLIT SPO	ON few	5 to 10%				·			
	SPLIT SPO			Cohesionles			ve Consistency	•		
	LBY TUBE		ne 30 to 45%				Soft, 5-8 M/St		Stiff	
KUN=RC	OCK CORE	mos	stly >50%	30-49	Den	se 50+ Very Dense 16	30 V-Stiff, 31	1+ Hard		1



PROJE	CT: Mas	SSDOT S	Silver Line E	xtension			SHE	EET	BORING NO.	
SITE L	OCATION:				JOB NO.: 60242256		1 of	f 4	B-33	
	MB	ΓA Right	of Way		LOCATION:		Elevation	on: To	tal Depth:	
	(Chelsea,	MA		N 2969417 E 7822	41	14.	.3'	81.0'	
DRILL	CONTRAC	TOR:	Northern Dri	II Service	ENG: William Checchi		BEGUN	N:	12/6/2013	
DRILL	RIG: A	TV Mobil	le B-48, Auto I	Hammer	DRILLER: Tim Tucker		FINISH	IED :	12/10/2013	
Hole Siz	ze:		Weather:			Ground Wa	ater (Depth/Elev.) :			
HW	Casing - 4	" ID	12/6/13	drizzle 48	F, 12/9/13 rain 44F, 12/10/13 cloudy 36F		8' bgs (1	2/9/13) in	54' casing	
Drilling	Method :				Drilling Fluid :	Top of Roc	k (Depth	າ) :		
	Rotary \	Wash wi	th Roller Bit	T	Water		No	ot Encount	ered	
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS	
					topsoil Dry, black to brown GRAVEL and SAND, little	e gilt	GM to			
					= 1,7, 2,330. to 2,500. 51.0 to EE and 5, 110.		SM			
	SPT-1	21	7-8	8"	Dry, tan fine GRAVEL and medium to fine SA medium dense	.ND, some silt,	GM to SM		11,363 ohm-cm I Sulfate not detected tilled water)	
			13-12		Dry, tan fine SAND, little silt, trace clay, medi	um dense				
5	SPT-2	19	6-7	16"			SM			
			12-14		FILL					
10			6-7		Dry, tan CLAY, few silt, trace gravel, very stif	f	CL	clay wash		
10	SPT-3	19	12-14	24"						
					Wet, tan stratified CLAY, few silt, very stiff,		CL to			
15	SPT-4	16	4-5	24"	and fine SAND, little silt, trace clay, medium o	dense	SM			
			11-18							
20	SPT-5	17	4-6	24"	Moist, tan CLAY, few silt, very stiff		CL			
SAMPLE	TYPES:	trac	e 0 to 5%		SPT Resistance				Approve/Date	
	SPLIT SPO									
	SPLIT SPOO FERB. TUBE			Cohesionles		esive Consistency	-	-		
	OCK CORE	som		5-9 Lo 30-49		3-4 Soft, 5-8 M/St 16-30 V-Stiff, 3		oull		
		1,1100		55 40						



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension		SH	EET E	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256	2 0	of 4	B-33
	MB	ΓΑ Right	of Way		LOCATION:	Elevati	ion: Tota	al Depth:
	(Chelsea	, MA		N 2969417 E 78	2241 14	1.3'	81.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION	ASTM Class.	1	REMARKS
	SPT-5	17	11-11	24"	Wet, tan CLAY, few silt, very stiff	CL		
25	- SPT-6	8	3-3 5-6	15"	Wet, tan SILT, some fine sand, loose	ML	sand in silt wa	ash
30_	SPT-7	12	4-6 6-7	12"	Wet, tan SILT, some fine sand, medium de	ense ML		
35	SPT-8	6	4-3 3-4	14"	Wet, brown olive SAND, little silt, loose	SM	_	
40	SPT-9	8	1-4	20"	Wet, olive stratified fine SAND, little silt, transport and fine SAND, little clay, trace silt, loose			
SPT=2"	SPT-10 E TYPES: SPLIT SPOO		5 to 10%	8"	Wet, tan SAND, trace silt, medium dense SPT Resistance		The Soft	Approve/Date
	SPLIT SPOO TERB. TUBE		e 15 to 25% ne 30 to 45%	Cohesionles		Cohesive Consistency 0-2 Ve	•	
	OCK CORE			5-9 Lo 30-49		3-4 Soft, 5-8 M/Stiff, 9-15 16-30 V-Stiff, 31+ Hard	Juli	



PROJE	CT: Mas	SSDOT S	Silver Line E	xtension		SH	EET	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256	3 0	of 4	B-33
	МВТ	A Right	of Way		LOCATION:	Elevati	on: Tot	al Depth:
	(Chelsea,	MA		N 2969417 E 782241	14	1.3'	81.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION	ASTM Class.		REMARKS
	SPT-10	11	6-7	8"	Wet, tan SAND, trace silt, medium dense	sw		
50	- SPT-11	8	7-4 4-5	6"	Wet, tan SAND, little silt, few gravel, loose	SM	drilling thru g	uravels
55_	SPT-12	48	3-15 33-30	10"	Wet, tan GRAVEL, some sand, little silt, trace of	clay, dense GM	drilling thru g bottom casin START to R of casing dri	g (12/6/13) oller Bit ahead
60_	SPT-13	96	21-53 43-26	8"	Wet, gray-brown GRAVEL, some sand, little sil	t, very dense GM	silty sand an	d fine gravel in wash
65_	SPT-14	70	27-36	10"	Wet, brown GRAVEL, some sand, little silt, ver	y dense GM	silty sand an	d fine gravel in wash
	SPT-15	48	34-22	6"	Wot brown GPAVEL come cond little cit. do-	nse GM	silty sand an	d fine gravel in wash
70				υ	Wet, brown GRAVEL, some sand, little silt, der	ISE GIVI	<u> </u>	A
SPT=2" SS3=3" OT=OST	E TYPES: SPLIT SPOC SPLIT SPOC FERB. TUBE DCK CORE	ON little	5 to 10% 15 to 25% ne 30 to 45%	Cohesionles 5-9 Lo 30-49	ose 10-29 Med. Dense 3-4	ive Consistency 0-2 Ve 4 Soft, 5-8 M/Stiff, 9-15 -30 V-Stiff, 31+ Hard	-	Approve/Date



PRO	JECT: Mas	ssDOT S	Silver Line E	xtension					SHE	ET	BORING NO.
SITE	LOCATION:				JO	B NO.: 60242256			4 of	f 4	B-33
	MB	ΓA Right	of Way		LC	CATION:			Elevation	on:	Total Depth:
		Chelsea,	-			N 2969417	E 782	2241	14.	.3'	81.0'
Dept	-	N Value	Blow Count (per 6 in.)	Sample Recovery		SAMPLE DESCRIPTIO			ASTM Class.		REMARKS
71	SPT-15	48	25-24	(inches)		Wet, brown GRAVEL, some sand	I, little silt	dense	GM		
75_	SPT-16	53	33-33 20-20	- 12"	-	Wet, brown GRAVEL, some sand	l, little silt,	very dense	GM		d and fine gravel in wash d and fine gravel in wash
80_	SPT-17	35	12-15 20-18	- 15"		Dry, gray CLAY, little fine sand an	nd silt, hai	d	CL	gray was	sh
						End of Boring @ 81' bgs				Bentonite from 0' to	e and cement Grout placed o 81' bgs
85_					-						
90_											
					<u> </u> -						
SAME	PLE TYPES:	trac	e 0 to 5%		_	SPT Res	sistance				Approve/Date
	'LE TYPES: 2" SPLIT SPO(Sri Res	sistai ICE				Approve/Date
SS3=3 OT=O	B" SPLIT SPOO STERB. TUBE ROCK CORE	ON little	e 15 to 25% ne 30 to 45%	Cohesionles 5-9 Lo	ose	10-29 Med. Dense	С	ohesive Consistency 3-4 Soft, 5-8 M/S 16-30 V-Stiff, 3	tiff, 9-15 S	-	



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	EI	BORING NO.	
SITE L	OCATION:				JO	B NO.: 60242256		1 of	2	B-34	
	MB	ΓΑ Right	of Way		LO	CATION:		Elevation	n: To	otal Depth:	
	(Chelsea	, MA			N 2969456 E 7821	54	9.2	2'	22.0'	
DRILL	CONTRAC	TOR :	Northern Dri	II Service	ΕN	G: William Checchi		BEGUN	l:	2/3/2014	
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DR	ILLER: Tim Tucker		FINISH	ED:	2/3/2014	
Hole Siz	ze:		Weather:		,		Ground Wa	ater (Dep	th/Elev.)	:	
	3.25" ID				02	2/03/14 cloudy 34 F		5'	bgs (12/2	0/13)	
Drilling	Method :				Dri	lling Fluid :	k (Depth):			
	Hol	low Sten	n Auger			None		No	t Encoun	tered	
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS	
				(1 11)		Moist, black SAND, some gravel, little silt		SM	Air Knife to	6' bgs (12/20/14)	
_						FILL			Hazmat sai		
						Moist, brown SAND, some gravel, little silt			Hazmat sai	mple	
_								SM			
5											
	SPT-1	18	4-7	24"		Dry, tan CLAY, trace gravel, sand, and silt, ve	ery stiff	CL			
	31 1-1	10	11-15	24							
10											
10			4-7			Dry, tan CLAY, trace silt, very stiff		CL			
	SPT-2	16		24"							
			9-11								
15											
	SPT-3	11	3-5	24"		Dry, tan CLAY, trace silt, stiff		CL			
			6-9								
20				,		Dry, tan CLAY, trace silt, very soft		CL		T . :=	
	TYPES:	trac				SPT Resistance				Approve/Date	
	SPLIT SPOO SPLIT SPOO			Cohosiania	20 D	ongity 0.4 Venul eggs	nosivo Consista -	v 0.21/	, Soft	1	
	SPLIT SPOC TERB. TUBE				onless Density: 0-4 Very Loose Cohesive Consisten 0 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/			_			
	OCK CORE				Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/ 49 Dense 50+ Very Dense 16-30 V-Stiff,						



PROJE	CT: Ma	ssDOT S	Silver Line E	xtension					SHEE	T E	BORING NO.
SITE	LOCATION:				JOB NO	O.: 60242256			2 of 2	2	B-34
	MB ⁻	TA Right	of Way		LOCATION				Elevation	: Tota	al Depth:
	(Chelsea	, MA		N 29	969456	E 7	82154	9.2'		22.0'
Depth	Sample	N	Blow Count	Sample		SAN	//PLE		ASTM		
(ft)	Type/No.		(per 6 in.)	Recovery			RIPTION		Class.	F	REMARKS
(11)	Турс/140.	value	(per o iri.)	(inches)		DECON	(II TIOI		Olass.		
				, ,	Dry, ta	an CLAY, trace silt, ve	ry soft		CL		
	SPT-4	4	woh/12"	14"	Wet, t	tan fine SAND, little sil	t, trace clay,	loose	SM		
			4-3								
					End o	of Boring @ 22.0' bgs					
					1						
25					1						
-											
_					_						
30											
-											
					<u> </u>						
-					1						
35					<u> </u>						
-											
-					4						
					1						
40											
					1						
					1						
					1						
					1						
45	 	<u> </u>	2				De-i-i			1	A
	E TYPES: SPLIT SPO	trac ON few				SPT	Resistanc	e			Approve/Date
	SPLIT SPO			Cohesionle	ss Density	0-4 Very Loose		Cohesive Consistence	v 0-2 Verv 9	Soft	
	TERB. TUBE		ne 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/S			
	OCK CORE				Dense	50+ Very Dense		16-30 V-Stiff, 3			



PROJI	CT: Mas	ssDOT S	Silver Line E	xtension			SHE	ET	BORING NO.	
SITE	LOCATION:				JOB NO.: 60242256		1 of	2	B-35	
	MB	ΓA Right	of Way		LOCATION:	E	levatio	on: To	tal Depth:	
	(Chelsea,	MA		N 2969523 E 781962	2	8.7	7'	22.0'	
DRILL	CONTRAC	TOR:	Northern Dri	II Service	ENG: William Checchi	В	BEGUN	1:	2/3/2014	
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DRILLER: Tim Tucker	F	INISH	ED:	2/3/2014	
Hole S	ize :		Weather:			Ground Wate	Vater (Depth/Elev.) :			
	3.25" ID				02/03/14 cloudy 34 F	Me	easure	d @ 4.0'bg	ıs (2/22/14)	
Drilling	Method :				Drilling Fluid :	Top of Rock ((Depth	ı) :		
	Holl	ow Sten	n Auger		None		No	t Encount	ered	
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS	
					asphalt pavement Moist, black SAND, little gravel and silt			Air Knife to	6' bgs (12/20/14) FILL	
 					Moist, black SAND, little gravel and slit		SM	Hazmat san	nnlo	
_					FILL			Hazmat san		
					Moist,light brown SAND, little gravel and silt		SM			
5										
	SPT-1	4	woh-2	18"			0.1			
			2-3		Moist, blue gray CLAY,trace silt, soft		CL			
10					Dry grov CLAV trace gilt yery stiff			after SDT-2	push 3" spoon to 12' bgs,	
	SPT-2	18	6-8	0	Dry, gray CLAY, trace silt, very stiff		CL	18" recovery		
	0112	10	10-10		Dry, olive CLAY, trace silt, very stiff					
15_										
	057.5	4.5	4-6	0.1"	Dry, olive CLAY, silt and fine sand lenses, very	stiff	CL			
	SPT-3	16		24"						
			10-11					<i>fire a manual and</i>	d silk in OLAV	
								ıırıe sana an	d silt in CLAY wash	
20							CL			
	E TYPES:	trac	e 0 to 5%		SPT Resistance	<u> </u>			Approve/Date	
SPT=2" SPLIT SPOON few 5 to 10%					or i reciciano				• •	
SS3=3" SPLIT SPOON little 15 to 25% Cohesionles					less Density: 0-4 Very Loose Cohesive Consistence			y Soft		
	TERB. TUBE				Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-1			Stiff		
RUN=R	OCK CORE	mos	stly >50%	30-49	Dense 50+ Very Dense 16	-30 V-Stiff, 31+	Hard			



PROJE	CT: Mas	SSDOT S	Silver Line E	xtension					SHE	ET	BORING NO.
SITE L	OCATION:				JO	3 NO.: 60242256			2 of	2	B-35
	MB	ΓA Right	of Way		LO	CATION:			Elevation	n:	Total Depth:
	(Chelsea,	, MA			N 2969523	E 7	81962	8.7	7'	22.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPI DESCRIP			ASTM Class.		REMARKS
	SPT-4	3	2-2 1-2	24"		Moist, olive to light gray CLAY,	soft		CL		
25						End of Boring @ 22.0' bgs				PVC be 2/07/14 -	Monitoring well set : screen from 10' to 20' bgs, intonite seal 3' to 4' bgs well bailed to 17' bgs,
_										recovere	d to 6.6' after 72 hrs
30											
35											
40_											
_											
-											
45	<u> </u>				Ш						<u> </u>
	E TYPES:	trac				SPT R	esistano	ce			Approve/Date
	SPLIT SPO			Cohesionles	ss De	nsity: 0-4 Very Loose		Cohesive Consistency	/ 0-2 \/en	v Soft	\dashv
	TERB. TUBE		ne 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/St	-		
	OCK CORE			30-49				16-30 V-Stiff, 3			



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension					SHE	ET	BORING NO.	
SITE L	OCATION:				JO	B NO.: 60242256			1 of	4	B-36	
	MB	ΓA Right	of Way		LO	CATION:			Elevation	n: To	tal Depth:	
	(Chelsea	MA			N 2969500 E 78	1909		9.4	4'	74.0	
DRILL	CONTRAC	TOR:	Northern Dri	II Service	ΕN	G: William Checchi			BEGUN	l:	1/2/2014	
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DR	ILLER: Tim Tucker			FINISH	ED :	1/2/2014	
Hole Si	ze:		Weather:					Ground Wa	ter (Dep	th/Elev.)		
HW	Casing - 4	" ID			01/	2/14 light snow 18 F			5' bgs (1/2/14)			
Drilling	Method :				Dri	lling Fluid :		Top of Rocl	k (Depth):		
	Rotary \	Nash wi	th Roller Bit			Water			No	t Encoun	tered	
Depth	Sample	N	Blow Count	Sample		SAMPLE			ASTM		REMARKS	
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)		DESCRIPTION			Class.			
				()		3" Asphalt pavement						
	SPT-1	10	7-5	16"		Dry, brown to black SAND, some gravel, lit	ttle sil	t	SM			
			5-7									
						FILL						
						Wet, tan GRAVEL and SAND, little silt			GM to			
5	SPT-2	7	7-3	5"					SM			
			4-2									
										gray clay w	ash	
						Moist, gray CLAY, trace gravel, fine sand,	and s	ilt soft		Casing to 9	, , pushed 3" spoon	
10	SPT-3	3	1-1	2"		Wiolst, gray OE (1, trade graver, fine saila,	unu 3	iit, sort			1', 20" recovery	
	0		2-6	_						Moisture co	ntent 24.1%	
			-							Plastic limit	15, Liquid limit 27,	
										Plastic inde	X 12	
										Roller bit op	pen hole from 9' to 74' bgs	
15			6-7			Dry, light brown CLAY, trace silt, very stiff			CL			
	SPT-4	17		18"								
			10-11									
	SPT-5	12	4-5	22"	Ė	Dry, olive brown CLAY, stiff, with silt and fi	ine sa	nd lenses,	CL	Moisture co	ntent 24.1%	
20 SAMDLE		<u> </u>				2" to 6" spacing			OL			
	TYPES: SPLIT SPO	trac ON few				SPT Resistance					Approve/Date	
SPT=2" SPLIT SPOON few 5 to 10% SS3=3" SPLIT SPOON little 15 to 25% Cohesionle:					nless Density: 0-4 Very Loose Cohesive Consistence			ve Consistency	0-2 Ven	y Soft	1	
	TERB. TUBE					10-29 Med. Dense		Soft, 5-8 M/St				
RUN=R						9 Dense 50+ Very Dense 16-30 V-Stiff, 3			I+ Hard			



SPT-8 SPT-8 SPT-8 SPT-8 SPT-8 SPT-9 3 2-1 2-1 2-1 2-1 2-1 3-1	PROJE	CT: Mas	ssDOT	Silver Line E	xtension		SHI	EET	BORING NO.
Chelsea, MA	SITE I	OCATION:				JOB NO.: 60242256	2 0	f 4	B-36
Sample N Sample N Sample N Sample SAMPLE DESCRIPTION Class SAMPLE TYPES SEPT-29 SEPT-29 SPT-10 5 2-2 24 Moist, clive CLAY, soft, with silt and fine sand lenses, 6' or CL Moisture content 24.1% SAMPLE TYPES SEPT-29 SPT-10 5 2-2 24 Moist, clive CLAY, soft, with silt and fine sand lenses, 6' or CL Moisture content 27.8% SAMPLE TYPES SEPT-29 SEPT-30 Sept-29 SEPT-30 Sept-29 SEPT-30 Sept-29 SEPT-30 Sept-30		MBT	ΓΑ Righ	t of Way		LOCATION:	Elevati	on: To	otal Depth:
SPT-5		(Chelsea	, MA		N 2969500 E 781909	9.	4'	74.0
SPT-S 12 7-9 12'		-							REMARKS
SPT-5 12 7-9 12 2 to 6' spacing Dry, gray tan CLAY, loose, with silt and fine sand lenses, 6' or greater spacing Dry, olive stratified CLAY, medium stiff, with fine sand, little SPT-7 6 2-2 20" SPT-7 6 2-2 20" Moist, light gray CLAY, medium stiff, with silt and fine sand lenses, 6' or 35', 22' recovery Moist, light gray CLAY, medium stiff, with silt and fine sand lenses, 6' or 35', 22' recovery Moist, light gray CLAY, medium stiff, with silt and fine sand lenses, 6' or 35', 22' recovery Moist, light gray CLAY, medium stiff, with silt and fine sand lenses, 6' or 35', 22' recovery Moist, clive CLAY, soft, with silt and fine sand lenses, 6' or 36', 22' recovery Moist, clive CLAY, soft, with silt and fine sand lenses, 6' or 36', 22' recovery Moist, clive CLAY, soft, with silt and fine sand lenses, 6' or 36', 22' recovery Approve/Date SPT-2 SPLT SPOON RAPPOVE/Date Approve/Date CL Approve/Date Approve/Date	(/	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		(10000000)	1				
25 SPT-6 5 2-2 24* Dry, gray tan CLAY, loose, with silt and fine sand lenses, 6* CL 30 SPT-7 6 2-2 20** Dry, olive stratified CLAY, medium stiff, with fine sand, little silt, loose SPT-8 5 3-2 0 Moist, light gray CLAY, medium stiff, with silt and fine sand lenses, 6* or SPT-8, pushed 3* spoon from 34* to 36, 22* recovery 40 SPT-9 3 2-1 24* Moist, clive CLAY, soft, with silt and fine sand lenses, 6* or SPT-8, pushed 3* spoon from 34* to 36, 22* recovery Approve/Date SPT-10 5 2-2 24 Moist, clive CLAY, medium stiff, with silt and fine sand lenses, 6* or CL Approve/Date SPT-10 5 2-2 24 Moist, clive CLAY, medium stiff, with silt and fine sand lenses, 6* or CL SAMPLE TYPES: Irace 0 to 5% SPT-12* SPLTI SPOON leve 5 to 10% SSS-3* SPLTI SPOON little 15 to 25% Cohesionless Density 0-4 Very Loose Cohesive Consistency, 0-2 Very Sctt		SPT-5	12	7-9	12'		CL		
25 SPT-6 5 2-2 24*	-							Roller bit of	en noie to 74 bgs
35 SPT-8 5 2-2 0 Moist, light gray CLAY, medium stiff, with silt and fine sand lenses, 6° or SPT-8, pushed 3° spoon from 34' to 36', 22° recovery Moist, olive CLAY, soft, with silt and fine sand lenses, 6° or Gradual lenses, 4" spacing Moist, olive CLAY, soft, with silt and fine sand lenses, 6° or Gradual lenses, 2° recovery Moist, olive CLAY, soft, with silt and fine sand lenses, 6° or Gradual lenses, 2° recovery Moist, olive CLAY, soft, with silt and fine sand lenses, 6° or Gradual lenses, 2° recovery Moist, olive CLAY, medium stiff, with silt and fine sand lenses, 6° or Gradual lenses, 2° spacing SPT-10 5 2-2 24 Moist, olive CLAY, medium stiff, with silt and fine sand CL SAMPLE TYPES: SPT-2' SPLIT SPOON SS3=3' SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Chesive Consistency 0-2 Very Soft	25	SPT-6	5		24"		CL		
35 SPT-8 5 2-2 0 Moist, light gray CLAY, medium stiff, with silt and fine sand lenses, 6° or SPT-8, pushed 3° spoon from 34' to 36', 22° recovery Moist, olive CLAY, soft, with silt and fine sand lenses, 6° or Gradual lenses, 4" spacing Moist, olive CLAY, soft, with silt and fine sand lenses, 6° or Gradual lenses, 2° recovery Moist, olive CLAY, soft, with silt and fine sand lenses, 6° or Gradual lenses, 2° recovery Moist, olive CLAY, soft, with silt and fine sand lenses, 6° or Gradual lenses, 2° recovery Moist, olive CLAY, medium stiff, with silt and fine sand lenses, 6° or Gradual lenses, 2° spacing SPT-10 5 2-2 24 Moist, olive CLAY, medium stiff, with silt and fine sand CL SAMPLE TYPES: SPT-2' SPLIT SPOON SS3=3' SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Chesive Consistency 0-2 Very Soft									
SPT-8 5	30	SPT-7	6		20""			Moisture co	ntent 21.8%
A0 SPT-9 3 2-1 24" Moist, olive CLAY, soft, with silt and fine sand lenses, 6" or Plastic limit 19, Liquid limit 41, Plastic limit 19, Liquid limit 41, Plastic limit 22 SPT-10 5 2-2 24 Moist, olive CLAY, medium stiff, with silt and fine sand lenses, 2" spacing SAMPLE TYPES: SPT-2" SPLIT SPOON few 5 to 10% SS3=3" SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft	35_	SPT-8	5	2-2	0		CL		
40 SPT-9 3 2-1 24" greater spacing Plastic limit 19, Liquid limit 41, Plastic index 22 45 SPT-10 5 2-2 24 Moist, olive CLAY, medium stiff, with silt and fine sand lenses, 2" spacing CL SAMPLE TYPES: trace 0 to 5% few 5 to 10% SST Resistance SPT=2" SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft				3-2					
45 SPT-10 5 2-2 24 Ienses, 2" spacing CL SAMPLE TYPES: trace 0 to 5% SPT Resistance Approve/Date SPT=2" SPLIT SPOON few 5 to 10% SS3=3" SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft	40	SPT-9	3		24"		CL	Plastic limit	19, Liquid limit 41,
45 SPT-10 5 2-2 24 Ienses, 2" spacing CL SAMPLE TYPES: trace 0 to 5% SPT Resistance Approve/Date SPT=2" SPLIT SPOON few 5 to 10% SS3=3" SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft						Maint alice OLAV medium of " other land"			
SPT=2" SPLIT SPOON few 5 to 10% SS3=3" SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft	45	SPT-10	5	2-2	24		CL		
SS3=3" SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft						SPT Resistance			Approve/Date
O1-001 END. 10DE 30111 50 10 40 /0 5-4 10056 10-24 Med. Delise 3-4 3011, 3-0 M/3111, 3-13 3111							_	-	
RUN=ROCK CORE mostly >50% 30-49 Dense 50+ Very Dense 16-30 V-Stiff, 31+ Hard								JUII	



PROJE	ECT: Mas	SSDOT S	Silver Line E	xtension		SHE	EET BORING NO.
SITE	LOCATION:				JOB NO.: 60242256	3 0	f 4 B-36
	MBT	ΓA Right	of Way		LOCATION:	Elevati	on: Total Depth:
	(Chelsea	, MA		N 2969500 E 781909	9.	4' 74.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count	Sample Recovery	SAMPLE DESCRIPTION	ASTM Class.	REMARKS
(11)	туре/110.	value	(per 6 in.)	(inches)		Class.	
	SPT-10	5	3-4	24"	Moist, olive CLAY, medium stiff, with silt and fine sand lenses, 2" spacing	CL	Roller bit open hole to 74' bgs
50_	SPT-11	6	3-4	24"	Moist, olive stratified, 3" CLAY, medium stiff, and 1" to 2" fine sand, little silt, loose Wet, fine sand, little silt, loose	CL to SM	gravel driven thru SPT sample
			2-5		vvet, iiile saitu, iittle siit, ioose	SM	
55_	SPT-12	3	1-2	24"	Moist, olive CLAY, soft, with silt and fine sand lenses	CL	
60_	SPT-13	1	woh/16"	24"	Moist, olive CLAY, very soft, with silt and fine sand lenses	CL	
					End of Sampling @ 61'bgs		11:00 Roller Bit ahead
					continue to Roller bit open hole to sand and gravel wash		
65					gray clay wash, trace fine sand	CL wash	
70							
	E TYPES:	trac			SPT Resistance		Approve/Date
SS3=3"	" SPLIT SPOO " SPLIT SPOO	ON little	e 15 to 25%				
	STERB. TUBE ROCK CORE		ne 30 to 45% stly >50%	5-9 Lo 30-49			Stiff



PROJE	ECT: Mas	ssDOT S	Silver Line E	xtension				SHE	ET	BORING NO.
SITE	LOCATION:				JO	3 NO.: 60242256		4 o	f 4	B-36
	MB	ΓA Right	of Way		LO	CATION:		Elevation	on: To	tal Depth:
	(Chelsea	, MA			N 2969500 E 7	'81909	9.	4'	74.0
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
71						gray clay wash, trace fine sand		CL wash	Roller bit op	en hole
-						gray sand wash, little gravel		SM or SC wash	behavior	cial till based on roller bit
75					- - -	End of Boring @ 74' bgs				nd cement Grout placed
80					- - -					
85					-					
90_					-					
-					= = -					
SAMPI	 .E_TYPES:	trac	ce 0 to 5%		<u> </u>	SPT Resistance		<u> </u>		Approve/Date
	' SPLIT SPO					OI I INGSISTATIO				Approve/Date
	SPLIT SPO	ON little			ss De	nsity: 0-4 Very Loose	Cohesive Consistency	<u>/</u> 0-2 Ver	y Soft	
	STERB. TUBE		ne 30 to 45%			10-29 Med. Dense	3-4 Soft, 5-8 M/St		Stiff	
RUN=R	OCK CORE	mos	stly >50%	30-49	Dens	e 50+ Very Dense	16-30 V-Stiff, 3	1+ Hard		



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	:E1	BORING NO.	
SITE L	OCATION:				JO	B NO.: 60242256		1 of	f 1	B-37	
	MB	TA Right	of Way		LO	CATION:		Elevation	on: To	otal Depth:	
	(Chelsea	, MA			N 2969574 E 78174	1	8.	7	12.0	
DRILL	CONTRAC	TOR :	Northern Dr	II Service	ΕN	G: William Checchi		BEGUN	1:	1/8/2014	
DRILL	RIG:	ATV Mobi	ile B48, Auto I	lammer	DF	ILLER: Tim Tucker		FINISH	ED:	1/8/2014	
Hole Siz	ze:		Weather:				Ground Wa	ater (Dep	oth/Elev.)	:	
	3.25" ID				1	/08/14 clear 20 F		4.0' bgs (12/30/13)			
Drilling	Method :				Dri	lling Fluid :	Top of Roc	k (Depth	n) :		
	Holl	low Sten	n Auger			None		No	t Encoun	tered	
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS	
						Dry, ballast stone and black SAND, some grav	el, few silt	SW	Air Knife to	6' bgs (12/30/13)	
						FILL			Hazmat saı	mplo	
	Bulk Sample					Wet, tan SAND, some gravel, few silt			gravel 40% fines 10.8% Hazmat sai	, sand 49.2%,	
5											
						Wat brown block CDAVEL and CAND and W	20D 1:44-	CM+-	Wood in au	• '	
	SPT-1	15	9-8	10"		Wet, brown-black GRAVEL and SAND and Wo silt, medium dense	JOD, little	GM to SM	(buried tree	: IIIIIDS)	
	0111	15	7-6	10					brown to bl	ack gravel, sand, silt, and	
									wood in au	ger spoil	
10								[adjacent to bridge abut	o Rte 1 overpass ment]		
	ODT 0		6-2	5"		Wet, dark brown PEAT, little sand, trace silt, so	PT				
	SPT-2	3		5"		,, ., , , ,					
			1-1			End of Boring @ 12.01 has					
						End of Boring @ 12.0' bgs					
15											
						,					
					İ						
SAMPLE	TYPES:	trac	e 0 to 5%			SPT Resistance		[Approve/Date	
	SPLIT SPO				SPI Kesistance					/ ipplovo/Dato	
	SPLIT SPO			Cohesionles	nless Density: 0-4 Very Loose Cohesive Consister			0-2 Ver	y Soft	1	
ST=SHE	LBY TUBE	son	ne 30 to 45%	5-9 Lo	D Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/3			tiff, 9-15 S	Stiff		
RUN=RO	OCK CORE	mos	stly >50%	30-49	Den	se 50+ Very Dense 16	-30 V-Stiff, 3	1+ Hard			



PROJE	CT: Mas	sDOT S	Silver Line E	xtension			SHE	EET	BORING NO.
SITE I	OCATION:				JOB NO.: 60242256		1 o	f 1	B-38
	MBT	ΓA Right	of Way		LOCATION:		Elevation	on: To	tal Depth:
	(Chelsea	, MA		N 2969659 E 78148	88	8.	0'	12.0
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	ENG: William Checchi		BEGUN	N:	1/8/2014
DRILL	RIG:	ATV Mobi	ile B48, Auto H	lammer	DRILLER: Tim Tucker		FINISH	IED :	1/8/2014
Hole S	ize :		Weather:			Ground Wa	ter (Dep	oth/Elev.):	
	3.25" ID				1/8/14 clear 20 F		5.	0' bgs (1/8	3/14)
Drilling	Method :				Drilling Fluid :	Top of Roc	k (Depth	n) :	
	Holl	ow Sten	n Auger		None		No	ot Encount	ered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	DESCRIPTION				REMARKS
					Dry, ballast stone and black GRAVEL and SA	ND, little silt	GP to	Air Knife to	6' bgs (12/20/13)
					FILL		SM		,
					Wet, light brown to tan GRAVEL and SAND, I	ttle silt	GM to SM	Hazmat san	nple
	Bulk							water at 3' b	gs (12/20/13)
	Sample							Hazmat san	nple
5									
"-								SPT wet at .	5' bgs (1/8/14)
					Wet, brown to gray GRAVEL and SAND, little	silt clav		or r wor ar	5 5gc (176/11)
	SPT-1	19	5-9	10"	medium dense	ont, olay,	GM to SM		
	G		10-7					Roller bit thi	ru gravels
								DIOWII Sanu	and peat in wash
10									
	SPT-2	5	11-3	18"	Wet, brown PEAT, medium stiff		PT	moisture con	
	0		2-3					-	, fines 14.1%
					End of Boring @ 12.0' bgs				
-									
-									
15									
					,				
 									
SAMPL	E TYPES:	trac	e 0 to 5%		SPT Resistance		1	1	Approve/Date
SPT=2"	SPLIT SPOO	ON few	5 to 10%		OF F Hookanso				
	SPLIT SPOO	ON little			nless Density: 0-4 Very Loose Cohesive Consistency:			y Soft	
	ELBY TUBE	som			D Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Sti			ff	
KUN=R	OCK CORE	mos	stly >50%	30-49 I	Dense 50+ Very Dense 1	5-30 V-Stiff, 31-	+ Hard		



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension				SHE	ET	BORING NO.
SITE L	OCATION:				JOI	B NO.: 60242256		1 of	f 2	B-39
	MBT	ΓA Right	of Way		LO	CATION:		Elevation	on: To	otal Depth:
	(Chelsea	, MA			N 2969712 E 78127	5	7.6	6'	22.0'
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	ΕN	G: William Checchi		BEGUN	1:	1/8/2014
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DR	ILLER: Tim Tucker		FINISH	ED :	1/8/2014
Hole Siz	ze:		Weather:		!		Ground Wa	ter (Dep	th/Elev.)	:
	3.25" ID					1/8/14 clear 15 F		6	bgs (1/8	/14)
Drilling I	Method :				Dril	ling Fluid :	Top of Roc	k (Depth	n) :	
	Holl	low Sten	n Auger			None		No	t Encoun	tered
Depth	Sample	N	Blow Count	Sample		SAMPLE DESCRIPTION		ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)		DESCRIPTION		Class.		
				, ,		Dry, Ballast stone and black GRAVEL and SA	ND, few silt		Air Knife to	6' bgs (12/20/14)
						FILL		SW		
	BULK					Dry to Moist, tan GRAVEL and SAND, few silt		GW to SW	Moisture co gravel 51%	ntent 6% ,sand 43.7%,
	SAMPLE								fines 5.3%	
5										
						Moist, light gray CLAY, trace gravel and sand,	stiff	CL		
	SPT-1	9	1-6	3"						
			3-2							
<u> </u>									brown peat	wash
10						Wet, brown PEAT, few sand and silt, very soft		PT		
	SPT-2	2	woh/12"	21"		, =, ca a a,,				
	0	_	2-2			Moist, blue gray CLAY, trace peat, very soft		CH		
								0		
15										
						Dry, gray brown CLAY,very stiff		CL		
	SPT-3	25	8-10	19"				02		
			15-16							
20										
SAMPLE TYPES: trace 0 to 5%						SPT Resistance				Approve/Date
	SPLIT SPO									-
	SPLIT SPOO				nless Density: 0-4 Very Loose Cohesive Consister			-	-	
	ERB. TUBE OCK CORE			5-9 Lo 30-49			4 Soft, 5-8 M/Si 6-30 V-Stiff, 3		DIIT	
	JOIN JOINE	1110	July -00/0	30-48	دا ای	o our very bende	, oo v-ouii, o	ı ı ıaıu		1



PROJE	CT: Mas	SSDOT S	Silver Line E	xtension					SHEET	BORING NO.
SITE I	OCATION:				JOB 1	NO.: 60242256			2 of 2	B-39
	MB	ΓA Right	of Way		LOCA				Elevation:	Total Depth:
		Chelsea,			N	2969712	E 7	'81275	7.6'	22.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)			MPLE RIPTION		ASTM Class.	REMARKS
	SPT-4	17	5-8 9-10	22"	Dry	, olive CLAY, very stiff			CL	
					End	d of Boring @ 22.0' bgs				
25					-					
30					-					
35					-					
40_					-					
1E					1					
45 SAMPL	 E_TYPES:	trac	e 0 to 5%			SP	T Resistand	 ce	<u> </u>	Approve/Date
	SPLIT SPO					- 31				/ ipprovo/Date
	SPLIT SPOO			Cohesionles	ss Densit	y: 0-4 Very Loose		Cohesive Consistency	0-2 Very So	ft
OT=OS	TERB. TUBE	som	ne 30 to 45%			10-29 Med. Dense		3-4 Soft, 5-8 M/St	-	
RUN=R	OCK CORE	mos	stly >50%	30-49	Dense	50+ Very Dense		16-30 V-Stiff, 3	1+ Hard	



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension				SHE	EET	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 o	f 1	B-40
	MBT	ΓΑ Right	of Way		LO	CATION:		Elevation	on: To	otal Depth:
	(Chelsea	, MA			N 2969793 E 7809	64	7.	4'	12.0
DRILL	CONTRAC	TOR :	Northern Dr	Il Service	ΕN	IG: William Checchi		BEGUN	1 :	1/8/2014
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DF	RILLER: Tim Tucker		FINISH	IED :	1/8/2014
Hole Siz			Weather:				Ground Wa	ter (Dep	oth/Elev.)	
	3.25" ID					1/8/14 clear 10 F		6'	bgs (1/08	3/14)
Drilling	Method :				Dri	lling Fluid :	Top of Roo	k (Depth	n) :	
	Holl	low Sten	n Auger			None		No	ot Encoun	tered
Depth	Sample	N	Blow Count	Sample		SAMPLE		ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)		DESCRIPTION		Class.		
				(inches)		Dry, Ballast stone and black GRAVEL and S	AND, little silt	GW to	Air Knife to	6' bgs (12/20/14)
						FILL		SW		
						1122				
	BULK									
	SAMPLE					Dry light brown GRAVEL and SAND, little sil		GM to		
								SM		
5										
			7.40			Wet, olive brown GRAVEL and SAND, little s	silt, medium	GM to		
	SPT-1	20	7-13	8"		dense		SM		
			7-4							
10										
						Wet, brown PEAT, soft		PT		
	SPT-2	4	7-3	16"				' '		
			1-2							
						End of Boring @ 12.0' bgs				
						3 - 1 3				
15										
20										
	TYPES:	trac	e 0 to 5%			SPT Resistance		1	I	Approve/Date
	SPLIT SPO									.,
SS3=3"	SPLIT SPOC	ON little	e 15 to 25%	Cohesionles	ss De	ensity: 0-4 Very Loose Coh	esive Consistenc	y 0-2 Ver	y Soft	
	TERB. TUBE						3-4 Soft, 5-8 M/S	stiff, 9-15 S	Stiff	
RUN=R0	OCK CORE	mo	stly >50%	30-49	Den	se 50+ Very Dense	16-30 V-Stiff, 3	1+ Hard		



SPTE_LOCATION:	PROJE	CT: Ma:	ssDOT S	Silver Line E	xtension			SHE	ET BC	ORING NO.
Chelsea, MA	SITE I	OCATION:				JOB NO.: 60242256		1 0	f 2	B-41
Chelses		MB ⁻	ΓΑ Right	of Way				Elevation	on: Total	Depth:
DRILL CONTRACTOR: Northern Drit Service ENG: William Checchi BEGUN: 18/2014			_	-		N 2969853 E 780	749	8.	3'	22.0'
DRILL RIG: ATV Mobile B-48, Auto Hammer DRILLER: Tim Tucker FINISHED: 18/2014	DRILL				Il Service					
Hole Size : 3.25° ID	DRILL	RIG:	ATV Mobil	e B-48. Auto I	Hammer			FINISH	ED:	1/8/2014
Drilling Method : Hollow Stem Auger	Hole S						Ground Wa	ter (Der	oth/Elev.):	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Depth Sample (ft) Type/No. Value Blow Count Sample (per 6 in) Blow Count Sample Description Sample Sample Description Sample Sample Description Description Sample Description Desc		3.25" ID				01/08/14 clear 8 F	N	/leasure	d @ 3.4' bgs	(2/22/14)
Depth Type/No. Value Blow Count Recovery (inches) Depth Type/No. Value Per 6 in. Recovery (inches) Depth Type/No. Per 6 in. Recovery (inches) Depth De	Drilling	Method :				Drilling Fluid :	Top of Roo	k (Depth	n) :	
Depth Sample Nample Nample Sample Sample Sample Sample Sample Description Desc		Hol	low Sten	n Auger		None		No	ot Encountere	ed
Change Chester Chest				<u> </u>						
Dry, cadebed ballast stone and black SAND, some gravel, SP Hazmat sample Hazmat sample		1			Recovery				RE	EMARKS
BULK Sample					(1 11)		, some gravel,		Air Knife to 6' b	as (12/20/14)
BULK sample								SP		
Survey S									Hazmat sample	
5 SPT-1 15 8-9 10" Wet, brown SAND, some gravel, little silt, medium dense SM water at 5' (12/20/13) SPT-2 2 woh/12" 22" Moist, dark brown PEAT, very soft PT SPT-3 15 1-6 21" 9-12 Dry, olive CLAY, stiff CL SAMPLE TYPES: SAMPLE TYPES: STPT-2' SPLIT SPOON Else 5 to 10% Else 5 to 10% SSA3-3' SPLIT SPOON CT=OSTERB. TUBE Some 30 to 45% S-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 MiStiff, 9-15 Stiff Stiff		BULK							Hazmat sample	
SPT-1 15		sample				Dry, tan SAND, some gravel, few silt		SP	gravel 41.3%, s	and 53.2%, fines 5.5%
SPT-1 15										
SPT-1 15 8-9 10" Wet, brown SAND, some gravel, little silt, medium dense SM	5									
SPT-1 15 8-9 10° 6-3									water at 5' (12/2	20/13)
SPT-1 15 6-3 10" SPT-2 2 woh/12" 22" 2-1				8-9		Wet, brown SAND, some gravel, little silt, m	edium dense	SM		
10 SPT-2 2 Woh/12" 22" SPT-2 2 Woh/12" 22"		SPT-1	15		10"					
SPT-2 2 woh/12" 22" Moist, dark brown PEAT, very soft PT				6-3						
SPT-2 2 woh/12" 22" Moist, dark brown PEAT, very soft PT										
SPT-2 2	10									
SPT-2 2 2 2-1				wob/12"		Moist, dark brown PEAT, very soft		PT		
15 SPT-3 15 1-6 21" Dry, olive CLAY, stiff CL SAMPLE TYPES: trace 0 to 5% few 5 to 10% SSPT-2" SPLIT SPOON few 5 to 10% SS3-3" SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft Some 30 to 45% 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff		SPT-2	2		22"					
SPT-3 15 1-6 21				2-1						
SPT-3 15 1-6 21										
SPT-3 15 1-6 21										
SPT-3 15 1-6 21" Dry, olive CLAY, stiff CL	1,5									
SPT-3 15	15					Dry, olive CLAY, stiff				
20 SAMPLE TYPES: trace 0 to 5% SPT Resistance Approve/Date SPT=2" SPLIT SPOON Ittle 15 to 25% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft OT=OSTERB. TUBE Some 30 to 45% 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff		SPT-3	15	1-6	21"			CL		
SAMPLE TYPES: trace 0 to 5% SPT Resistance Approve/Date SPT=2" SPLIT SPOON few 5 to 10%				9-12						
SAMPLE TYPES: trace 0 to 5% SPT Resistance Approve/Date SPT=2" SPLIT SPOON few 5 to 10%										
SAMPLE TYPES: trace 0 to 5% SPT Resistance Approve/Date SPT=2" SPLIT SPOON few 5 to 10% 5 to 10% Cohesive Consistency 0-2 Very Soft SS3=3" SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft OT=OSTERB. TUBE some 30 to 45% 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff										
SAMPLE TYPES: trace 0 to 5% SPT Resistance Approve/Date SPT=2" SPLIT SPOON few 5 to 10%		1								
SPT=2" SPLIT SPOON few 5 to 10% SS3=3" SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft OT=OSTERB. TUBE some 30 to 45% 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	20								<u> </u>	
SS3=3" SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft OT=OSTERB. TUBE some 30 to 45% 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff						SPT Resistance				Approve/Date
OT=OSTERB. TUBE some 30 to 45% 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff										
								_	•	
									74III	



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension					SHEE	ΞT	BORING NO.
SITE L	OCATION:				JOI	3 NO.: 60242256			2 of	2	B-41
	MB	ΓΑ Right	of Way		LO	CATION:			Elevation	n: To	otal Depth:
	(Chelsea,	, MA			N 2969853	E 7	780749	8.3'		22.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample			MPLE RIPTION		ASTM Class.	•	REMARKS
	SPT-4	7	2-3	(inches)		Moist, olive CLAY, loose			CL		
			4-5								
05						End of Boring @ 22.0' bgs				PVC sc	ionitoring well set : reen from 10' to 20' bgs, onite seal 2' to 4' bgs
25											
30											
35											
40											
45											
•	TYPES:	trac	e 0 to 5%			SP	T Resistan	ce	+		Approve/Date
	SPLIT SPO										,,
	SPLIT SPO		e 15 to 25%	Cohesionles	s De	nsity: 0-4 Very Loose		Cohesive Consistence	y 0-2 Very	Soft	
	TERB. TUBE					10-29 Med. Dense		3-4 Soft, 5-8 M/S		ff	
RUN=R	OCK CORE	mos	stly >50%	30-49	Dens	e 50+ Very Dense		16-30 V-Stiff, 3	1+ Hard		



PROJE	CI: Mas	SSDOT S	Silver Line E	xtension	ı		SHE	:E1	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256		1 of	f 3	B-42
	MB	ΓA Right	of Way		LOCATION:		Elevation	on: To	otal Depth:
	(Chelsea,	MA		N 2969849 E 7806	31	10	.8'	61.0
DRILL	CONTRAC	TOR:	Northern Dri	Il Service	ENG: William Checchi		BEGUN	N:	12/5/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DRILLER: Tim Tucker		FINISH	IED :	12/5/2013
Hole Siz	ze:		Weather:		•	Ground Wa	ater (Dep	oth/Elev.)	:
HW	Casing - 4	" ID			12/5/13 cloudy 40 F		5'	bgs (12/5	5/13)
Drilling	Method :				Drilling Fluid :	Top of Roc	k (Depth	n) :	
	Rotary \	Nash wi	th Roller Bit		Water		No	ot Encoun	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS
					3" Asphalt pavement				
					- -			brown grav	el and sand in wash
	SPT-1	2	9-1	4"	Dry brown to black GRAVEL and SAND, little	e silt, loose	GM to SM		
			1-1		FILL				
5	SPT-2	6	5-2	2"	Wet, brown GRAVEL and SAND, little silt, re and ash, loose	d brick chips	GM to SM		, pushed 3" spoon ', 6" recovery
			4-4						
								red brick ch	nips in wash
					-			water lost of	luring casing washout
					Moist, gray CLAY, trace fine sand and silt, ve		CL		
10	SPT-3	1	1/24"	12"	Wet, brown PEAT, with sand and clay, very	soft	PT		
					_				
								brown peat	and sand wash
					-				
					Wet, blue gray CLAY, trace fine sand, silt, ar	nd peat, verv	CH	~	hed to 14' bgs pen hole to 59' bgs
15	SPT-4	7	1/10"-1	12"	soft Dry, olive CLAY, trace fine sand and silt, me			,	Ü
			6-9		Dry, olive CLAY, trace line sand and slit, me	aium stiit	CL		
20	SPT-5	11	3-5	22"	Dry, olive CLAY, stiff		CL	Moisture co	ontent 33.8%
	TYPES:	trac			SPT Resistance				Approve/Date
	SPLIT SPOO			CohooiI	on Donnity: 0.4 Variations	onivo Consister	, 0.01/-	v Co#	-
	SPLIT SPOO ELBY TUBE			Cohesionles 5-9 Lo		esive Consistency 3-4 Soft, 5-8 M/S	-		
	OCK CORE	mos			Dense 50+ Very Dense	16-30 V-Stiff, 3			



SITE LO	CATIONE			xtension			0	ET	BORING NO.
	JCATION.				JOB NO.: 60242256		2 of	3	B-42
	MBT	A Right	of Way		LOCATION:		Elevation	on: To	tal Depth:
	C	helsea	, MA		N 2969849 E 78	30631	10.	.8'	61.0
	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS
	SPT-5	11	6-7	22"	Moist, olive CLAY, stiff		CL	Moisture co	ntent 33.8%
25	SPT-6	5	2-2	22"	Moist, olive CLAY, trace gray clay, mediur	m stiff	CL	Moisture co	ntent 36.5%
30	SPT-7	1	woh/18" 2 mech push	24"	Moist, olive CLAY, very soft		CL		
35	SPT-8	1	woh/24"	24"	Moist, olive CLAY, silt and fine sand lense soft	es every 4", very	CL		
40	SPT-9	1	woh/18"	24"	Moist, olive CLAY, very soft		CL		ntent 37.6% 23, Liquid limit 50, x 27
SAMPLE SPT=2" S	SPLIT SPOC		5 to 10%	24"	Moist, olive CLAY, very soft SPT Resistance		CL		Approve/Date
	PLIT SPOC		e 15 to 25% ne 30 to 45%			Cohesive Consistency	-		
	CK CORE	mos		5-9 Lo 30-49 I		3-4 Soft, 5-8 M/St 16-30 V-Stiff, 31-		oull	



PROJ	ECT: Mas	ssDOT	Silver Line E	xtension					SHE	ET	BORING NO.
SITE	LOCATION:				JOB NO.:	60242256			3 of	3	B-42
	MB	ΓA Righ	t of Way		LOCATION:				Elevation	on: To	tal Depth:
	(Chelsea	, MA		N 2969849	9	E 78	80631	10.	.8'	61.0
Depth (ft)	n Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery		SAMPLE DESCRIPTION			ASTM Class.		REMARKS
	SPT-10	1	woh/24"	(inches)	Moist, olive	gray CLAY, very soft			CL		
50_	ST-5	-	Mech push	0	Moist, olive	gray CLAY, very soft			CL	51', 24" reco	-
<u>-</u>										Moisture co.	ntent 38%
55	SPT-11	1	woh/18"	24"	Moist, olive	CLAY, very soft			CL		
60_	ST-6	-	Mech push	0	Moist, olive	CLAY, very soft			CL	after ST-6, p 61', 24" reco Moisture co	•
<u>-</u>					End of Borin	g @ 61' bgs				from 0.5' to	nd cement Grout placed 61' bgs, patch set 0' to 0.5'
65											
70 SAMPI	LE TYPES:	trac	ce 0 to 5%			SPT Res	sistance)			Approve/Date
	" SPLIT SPO										11.5.5.5
ST= SI	" SPLIT SPOO	sor	ne 30 to 45%	5-9 Lo	oose 10-2	Very Loose 29 Med. Dense		3-4 Soft, 5-8 M/St	- tiff, 9-15 S		
KUN=	ROCK CORE	mo	stly >50%	30-49	Dense 50+	Very Dense		16-30 V-Stiff, 31	1+ Hard		



PROJE	CI: Mas	SSDOT S	Silver Line E	xtension				SHE	EI	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 of	1	B-43
	MB	ΓA Right	of Way		LO	CATION:		Elevation	on: To	otal Depth:
	(Chelsea	, MA			N 2969908 E 7805	02	7.	9	9.1
DRILL	CONTRAC	TOR :	Northern Dri	II Service	ΕN	G: William Checchi		BEGUN	l:	1/7/2014
DRILL	RIG: A	ATV Mobi	le B48, Auto H	lammer	DF	ILLER: Tim Tucker		FINISH	ED:	1/7/2014
Hole Siz	ze :		Weather:				Ground Wa	ater (Dep	th/Elev.)	:
	3.25" ID				1	/07/14 cloudy 10 F		6.0)' bgs (1/0	07/14)
Drilling I	Method :				Dri	lling Fluid :	Top of Roo	k (Depth):	
	Holl	ow Sten	n Auger			None		No	t Encoun	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
						Dry, ballast stone and black GRAVEL and So	AND, little silt		Air Knife to	6' bgs (12/19/13)
					-	and roots FILL		GM to SM	Hazmat saı	mple
						Dry, brown SAND, some gravel, little silt		SM	Hazmat saı	mple
5					_				brown grav spoil	el and silt in SAND auger
			6-11			Moist, brown SAND, some gravel, little silt, m	nedium dense	SM		
	SPT-1	28	17-28	6"						and and all in CAND account
40	SPT-2	100	100/1"	1"		SPT and Auger Refusal			spoil gravel in SI	el and silt in SAND auger PT tip
10						End of Boring @ 9.1' bgs				
_										
15										
_										
					1					
					_					
	TYPES:	trac				SPT Resistance				Approve/Date
	SPLIT SPO									1
	SPLIT SPOO LBY TUBE			Cohesionles			esive Consistenc	_		
	CK CORE	son		5-9 Lo 30-49			3-4 Soft, 5-8 M/S 16-30 V-Stiff, 3		ull	



PROJE	CT: Mas	SSDOT S	Silver Line E	xtension				SHE	ET	BORING NO.
SITE L	OCATION:				JC	DB NO.: 60242256		1 of	f 1	B-44
	MBT	ΓA Right	of Way		LC	OCATION:		Elevation	on: To	otal Depth:
	(Chelsea	, MA			N 2969940 E 780363		8.	1'	12.0'
DRILL	CONTRAC	TOR:	Northern Dri	Il Service	E١	NG: William Checchi		BEGUN	1 :	12/17/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto H	- - - - - - - - - - - - - - - - - - -	DF	RILLER: Tim Tucker		FINISH	ED:	12/17/2013
Hole Siz	ze :		Weather:				Ground Wa	ater (Dep	oth/Elev.)	:
	3"			1:	2/1	7/13 partly cloudy 15 F		5'	bgs (12/1	7/13)
Drilling	Method :				Dr	illing Fluid :	Top of Roc	k (Depth	n) :	
	Open h	ole - driv	ve 3" spoon			Water		No	ot Encoun	tered
Depth	Sample	N	Blow Count	Sample		SAMPLE		ASTM		
(ft)	Type/No.	Value	(per 6 in.)	Recovery		DESCRIPTION		Class.		REMARKS
				(inches)		п				
						Dry, topsoil, ballast stone,and dark brown GRA\ SAND, little silt	/EL and		Air Knife to	6' bgs (12/17/13)
]									
	†					Dry, dark brown to black GRAVEL and SAND, li	ttle silt,		Creosote o	dor from soil spoil
	BULK SAMPLE					railroad spike		GM to SM	0,000010 0	aor morn don apon
	0,					FILL		0		
5										
						wet, dark brown to black GRAVEL and SAND, li	ttle silt			
						Wet, black to brown SAND, little gravel, few silt	and clay,	SW	Moisture co	intent 44%
	SPT-1	16	7-11	12		medium dense	•		gravel 20.5	%, sand 63.5%,
			5-2			Moist, brown PEAT, with sand and clay, soft		PT	fines 16% Plastic limit	44, Liquid limit 76,
								FI	Plastic inde	x 32
10						Dry, olive gray CLAY, trace peat, medium dense	2	CL		
	SPT-2	21	4-11	12"		The state of the s	•			
	5		10-20							
						End (Daine @ 40th as				
						End of Boring @ 12' bgs				
15										
20 SAMPLE	TYPES:	trac	e 0 to 5%			SPT Resistance				Approve/Date
	SPLIT SPOC					Oi i itesisiane				/ ipplovo/Dato
SS3=3"	SPLIT SPOC	ON little	15 to 25%	Cohesionles	s D	ensity: 0-4 Very Loose Cohesin	ve Consistency	0-2 Ver	y Soft	
	LBY TUBE	son	ne 30 to 45%	5-9 Lo	ose	10-29 Med. Dense 3-4	Soft, 5-8 M/S	tiff, 9-15 S	Stiff	
RUN=R0	OCK CORE	mos	stly >50%	30-49	Den	se 50+ Very Dense 16-3	30 V-Stiff, 3	1+ Hard		



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	:E1	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 of	2	B-45
	MB	ΓΑ Right	of Way		LO	CATION:		Elevation	on: To	otal Depth:
	(Chelsea	, MA			N 2969879 E 7793	40	11.	.7'	21.0'
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	ΕN	IG: William Checchi		BEGUN	1:	12/11/2013
DRILL	RIG :	Мо	bile B-49 Truc	k	DF	RILLER: Tim Tucker		FINISH	ED:	12/11/2013
Hole Siz	ze:		Weather:		•		Ground Wa	ater (Dep	oth/Elev.)	
HW	Casing - 4	" ID		12	2/11	/13 partly cloudy 30 F		5'	bgs (12/1	1/13)
Drilling	Method :		!		Dri	lling Fluid :	Top of Roc	k (Depth	ı) :	
	Rotary	wash wi	th Roller Bit			Water		No	t Encoun	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
						Dry, topsoil Dry,brown SAND, little gravel and silt		SM		
	SPT-1	53	11-13	16"		Dry, brown to black SAND, little gravel and si	lt, very dense	SM		
	351-1	55	40-44	10		Dry, tan medium to fine SAND, trace gravel a dense	and silt, very			
5	SPT-2	69	45-35	10"		Dry, black to brown SAND, little gravel and si	lt, very dense	SM	wet soil sar	nple
			34-19			FILL				
	SPT-3	32	15-9	4"		Wet, brown SAND, little gravel and silt, dense	е	SM		
	SP1-3	32	23-28	4						
			20 20						black sand	and gravel wash
10	OPT 4	_	5-5	4"		Wet, black GRAVEL and SAND, little silt, loo	se	SM		
	SPT-4	7	2-3	4"						
									brown peat	in wash
15	SPT-5	3	4-1	10"		Wet, brown PEAT, some sand and clay, very Wet, blue gray CLAY, little peat, soft	SOTT	PT CH		
	361-2	3	2-4	10						
			2 7							
20	SPT-6	33	12-15	20"		Moist, olive CLAY, trace sand, silt, and peat,	hard	CL		
	TYPES:	trac	e 0 to 5%			SPT Resistance				Approve/Date
SPT=2"	SPLIT SPO	ON few	5 to 10%							
	SPLIT SPO			Cohesionles	ss De		esive Consistency	<u>/</u> 0-2 Ver	y Soft	
	TERB. TUBE			5-9 Lo			3-4 Soft, 5-8 M/S		Stiff	
KUN=RC	OCK CORE	mo	stly >50%	30-49	Den	se 50+ Very Dense	16-30 V-Stiff, 3	1+ Hard		I



PROJE	CT: Mas	ssDOT	Silver Line E	xtension					SHE	ET	BORING NO.
SITE I	OCATION:					NO.: 60242256			2 of	f 2	B-45
	MB	ΓA Right	of Way		LOC	ATION:			Elevation	on:	Total Depth:
	(Chelsea	, MA		N	2969879	E 7	79340	11.	.7'	21.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)			MPLE		ASTM Class.		REMARKS
	SPT-6	33	18-25	20"	М	oist, olive CLAY, trace s	and, silt, peat,	hard	CL		
25					Eı	nd of Boring @ 21.0' bgs	:			Bentonite from 0' to	and cement Grout placed 21' bgs
_					- - -						
30					- - -						
35					- - - -						
40					- - -						
					 - - -						
45											T
	E TYPES:	trac				SF	T Resistanc	e			Approve/Date
	SPLIT SPO			Cohosiants	no Dor-	itu: 0.4 Vand 200-		Cohoniya Consists	, 0.21/	v Coff	-
	SPLIT SPOO TERB. TUBE		e 15 to 25% ne 30 to 45%			0-4 Very Loose 10-29 Med. Dense		Cohesive Consistency 3-4 Soft, 5-8 M/St	-		
	OCK CORE				Dense	50+ Very Dense		16-30 V-Stiff, 3			



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	EI	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 of	2	B-46
	MB	ΓΑ Right	of Way		LO	CATION:		Elevation	n: To	otal Depth:
	(Chelsea,	MA			N 2969960 E 78029		7.6	6'	22.0'
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	ΕN	G: William Checchi		BEGUN	l:	12/30/2013
DRILL	RIG: A	TV Mobil	e B-48, Auto I	Hammer	DR	ILLER: Tim Tucker		FINISH	ED:	12/30/2013
Hole Siz	ze:		Weather:				Ground Wa	ater (Dep	th/Elev.)	:
	3.25" ID				12	2/30/13 cloudy 45 F		4'	bgs (12/3	0/13)
Drilling	Method :				Dri	lling Fluid :	Top of Roc	k (Depth):	
	Hol	low Sten	n Auger			WATER		No	t Encoun	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
						Dry, ballast stone and black GRAVEL and SAN	D, little silt		Air Knife to	6' bgs (12/19/13)
						FILL			Hazmat sar	nple
5						Wet, black to brown GRAVEL and SAND, little peat	silt, trace	GM to SM	Hazmat sar	nple
						реац				el, sand, silt, and peat in
						Wet, brown PEAT, very soft		PT	auger spoil	
10	SPT-1	0	woh/24"	22"		·				
	SPT-2	23	4-9	24"		Moist, blue gray CLAY, trace peat, stiff Dry, light gray brown CLAY, trace silt, very stiff		ОН		
			14-15			Dry, light gray brown CLAT, trace siit, very still		CL		
15	SPT-3	14	3-6	24"		Dry, olive CLAY, stiff		CL		
			8-11							
SAMPLE	TYPES:	trac	e 0 to 5%			SPT Resistance				Approve/Date
SPT=2"	SPLIT SPO	ON few	5 to 10%							
	SPLIT SPO	ON little	15 to 25%	Cohesionles	ss De	ensity: 0-4 Very Loose Cohes	ive Consistency	0-2 Ver	y Soft	
	LBY TUBE	som					Soft, 5-8 M/S		tiff	
RUN=RO	OCK CORE	mos	stly >50%	30-49	Dens	se 50+ Very Dense 16	30 V-Stiff, 3	1+ Hard		ĺ



PROJE	CT: Ma	ssDOT \$	Silver Line E	xtension				SHEET	BORING NO.
SITE I	OCATION:				JOE	8 NO.: 60242256		2 of 2	B-46
	MB	ΓΑ Right	t of Way		LOC	CATION:		Elevation:	Total Depth:
		Chelsea	, MA			N 2969960 E	780291	7.6'	22.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.	REMARKS
	SPT-4	8	1-4	24"		Moist, olive CLAY, medium stiff		CL	
			4-7			End of Boring @ 22.0' bgs			
25									
 - -									
30					-				
-					-				
35					-				
- -					-				
40					-				
 - 					-				
					-				
45									
	E TYPES:	trac				SPT Resistan	nce	· — 	Approve/Date
	SPLIT SPO						Ta		
	SPLIT SPOO TERB. TUBE		e 15 to 25% ne 30 to 45%			0-4 Very Loose 10-29 Med. Dense	Cohesive Consistency 3-4 Soft, 5-8 M/S	-	ft
	OCK CORE			30-49			16-30 V-Stiff, 3		



PROJE	ECT: Mas	ssDOT S	Silver Line E	xtension		SHEET	BORING NO.
SITE	LOCATION:				JOB NO.: 60242256	1 of 5	B-47
	MB	ΓΑ Right	of Way		LOCATION: Ele	evation: T	otal Depth:
	(Chelsea,	MA		N 2969928 E 780259	9.8'	109.0'
DRILL	CONTRAC	TOR:	Northern Dri	Il Service	ENG: William Checchi BE	GUN:	12/11/2013
DRILL	RIG:	Mol	oile B-59, Truc	k	DRILLER: Wayne Tucker, Tim Tucker FIN	VISHED :	12/18/2013
Hole S	ize: 5"	to 3"ID	Weather:	12/11/1	3 partly cloudy 30F,12/12/13 clear 24F, Ground Water	(Depth/Elev.)	:
Ca	asing: PW to	NW	12/13/13	cloudy 28	F,12/16/13 clear 27F,12/18/13 cloudy 28F	9' bgs (12/	13/13)
Drilling	Method :	,			Drilling Fluid : Top of Rock (D	Depth):	
	Rotary \	Wash wi	th Roller Bit		Water	Not Encou	ntered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		STM ass.	REMARKS
					Grass, topsoil and roots Dry, brown SAND, little fine gravel, few silt S	SW	
					Dry, brown SAND, little line graver, few slit	OVV	
			26-21				
	SPT-1	41	20-9	12"	FILL		
5	ODT 0	4-7	19-8	0,1		M to SM	
	SPT-2	17	9-9	9"			
			3-3			black grav	rel and sand wash
							vel and sand wash
10	SPT-3	5	9-3	0	No Recovery		3, pushed 3" spoon 11', no recovery
	0110		2-2	· ·			
						brown pea	nt and gray clay wash
-						gray clay	wash
					Moist, olive CLAY, hard	CL	
15	SPT-4	47	17-22	16"	Worst, Give SEAT, Hard	Moisture of	content 25.7%
			25-33				
20	SPT-5	14	4-6	24"		CL Moisture of	content 33.5%
	E TYPES:	trac			SPT Resistance		Approve/Date
	' SPLIT SPO(' SPLIT SPO(Cohoologic	s Donsity 0.4 Vary Loose Cabasina Capaigna Capaigna	-2 Van: \$24	-
	SPLIT SPOO STERB. TUBE			Cohesionles 5-9 Lo		-	
					-49 Dense 50+ Very Dense 16-30 V-Stiff, 31+ Hard		



PROJ	ECT: Mas	ssDOT	Silver Line E	xtension			SHE	EET	BORING NO.
SITE	LOCATION:				JOB NO.: 60242256			f 5	B-47
	MB	TA Righ	t of Way		LOCATION:		Elevation	on: To	tal Depth:
	(Chelsea	, MA		N 2969928	E 78025	9.	8'	109.0'
Depth	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		MPLE RIPTION	ASTM Class.		REMARKS
	SPT-5	14	8-10	24"	Moist, olive CLAY, stiff		CL	Moisture co	ntent 33.5%
	Shelby Tube	-	Mech push	0				40 minute F no recovery	lold after push,
25_	OT-1	-	Hyd push	15"	Moist, olive CLAY		CL	moisture co	21, Liquid limit 48,
									en hole from 24' to 89' nd 12/13/13)
30	OT-2	-	Hyd push	23.5"	Moist, olive CLAY		CL		
35	OT-3	-	Hyd push	24"	Moist, olive CLAY		CL	Moisture co	ntent 37.3%
40	OT-4	-	Hyd push	0	Moist, olive CLAY		CL		pushed 3" spoon 11', 24" recovery
45	OT-5	-	Hyd push	24"	Moist, olive CLAY		CL	Moisture	e content 43.8%
	E TYPES:	trac	ce 0 to 5%		SP*	Γ Resistance			Approve/Date
SPT=2	" SPLIT SPO	ON few	5 to 10%			ı			
	SPLIT SPO						sive Consistency 0-2 Ver	-	
								5-8 M/Stiff, 9-15 Stiff	
KUN=h	ROCK CORE	mo	stly >50%	30-49	Dense 50+ Very Dense	10	6-30 V-Stiff, 31+ Hard		<u> </u>



PROJ	ECT: Mas	ssDOT S	Silver Line E	xtension		SH	IEET	BORING NO.
SITE	LOCATION:				JOB NO.: 60242256	3	of 5	B-47
	MBT	ΓA Right	of Way		LOCATION:	Eleva	tion: T	otal Depth:
	(Chelsea	, MA		N 2969928 E 7	80259	9.8'	109.0'
Depth	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION	ASTN Class		REMARKS
	OT-5	-	Hyd push	24"	Moist, olive CLAY	CL	Moisture o	ontent 43.8%
50_	OT-6	-	Hyd push	24"	Moist, olive CLAY,	CL		
55	SPT-6	0	woh/24"	24"	Moist, olive CLAY, very soft	CL		
60_	OT-7	-	Hyd push	24"	Moist, olive CLAY	CL		ontent 31%, it 16, Liquid limit 30, ex 14
65_	SPT-7	0	woh/24"	24"	Moist, olive CLAY, very soft	CL		
70 SAMPI	OT-8	- trac	Hyd push	24"	Moist, olive CLAY SPT Resistance	CL re		Approve/Date
	" SPLIT SPO	ON few						
	" SPLIT SPOO			Cohesionles			ery Soft	
	F=OSTERB. TUBE some 30 to 45% 5-9 Lo				· · · · · · · · · · · · · · · · · · ·			
KUN=F	ROCK CORE	mos	stly >50%	30-49	Dense 50+ Very Dense	16-30 V-Stiff, 31+ Hard		



PROJI	ECT: Mas	ssDOT	Silver Line E	xtension				SHE	ET	BORING NO.
SITE	LOCATION:				JOB NO.: 60242256			4 of	5	B-47
	MBT	ΓA Righ	t of Way		LOCATION:			Elevation	on: To	tal Depth:
	(Chelsea	, MA		N 2969928	E 780	259	9.	8'	109.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		MPLE RIPTION		ASTM Class.		REMARKS
71	OT-8	-	Hyd push	24"	Moist, olive CLAY					
75_	SPT-8	0	woh/24"	24"	Moist, olive CLAY, very so	ft				
80_	OT-9	-	Hyd push	23"	Moist, olive CLAY				Moisture col	ntent 29.8%
-										
85	SPT-9	0	woh/24"	24"	Moist, olive CLAY, trace si	It lenses, very sol	it			
90	OT-10	-	hyd push	0						
	SPT-10	78	38-40	14"	Moist, olive SAND, some s	silt, few gravel, ve	ry dense	SM	bottom borir	ng (12/13/13)
95	SPT-11	39	16-12	12"	Wet, olive GRAVEL and S		nse	GM to SM	set NW casi	ng to 94' (12/16/13)
	E TYPES:	trac			SP	T Resistance				Approve/Date
	" SPLIT SPOO ' SPLIT SPOO			Cohesionles	s Density: 0-4 Very Loose	Co	hesive Consistency	0-2 Ver	y Soft	
	STERB. TUBE		ne 30 to 45%				3-4 Soft, 5-8 M/St		Stiff	
RUN=F	ROCK CORE	mo	stly >50%	30-49	Dense 50+ Very Dense		16-30 V-Stiff, 31	I+ Hard		



PRO	IECT :	/lassDO	T Silver Line	Extension		S	HEET	BORING NO.
SITE	LOCATIO	N:			JOB NO.: 60242256		of 5	B-47
	N	1BTA Ri	ght of Way		LOCATION:	Elev	ation:	Total Depth:
		Chelse	ea, MA		N 2969928 E 780)259	9.8'	109.0'
			Blow Count	Sample				
Dept	h Samp	e N	(per 6 in.)	Recovery	SAMPLE	AST	M	DEMARKS
(ft)	Type/N		IE or Drilling	or REC &	DESCRIPTION	Clas	SS.	REMARKS
	'		Rate (min/ft)	RQD				
	SPT-1	1 39		12"	Wet, olive GRAVEL and SAND, little silt, d	ense GM SM		
						Siv	'	
100	SPT-1	2 174	46-74	10"	Wet, olive SAND, little gravel, silt, and clay	, very dense SM	1	
_	0, 1	2 17-	100/4"	1 10			NW Casii	ng set to 100.5'
							3" Roller	Bit open hole to 104',
							thru grave	els, cobbles, small boulders
			7 min		Cambridge Argillite [Gray]			npression test 4339 psi
105_			<u> </u>		3 3 3 11 171		Buik dens	sity 168 pcf
			5.5 min	Rec=59"				
	RUN	1	4 min					
			3.75 min	RQD= 62%				
			4 min		Find of Paring @ 4000 base			
110_					End of Boring @ 109' bgs			
				 				
115_								
				1				
				1				
				<u> </u>				
120								
	LE TYPES	: t	race 0 to 5%		SPT Resistance	Į.		Approve/Date
	2" SPLIT SI		ew 5 to 10%					_
	S" SPLIT SF			Cohesionles		ohesive Consistency 0-2	-	
	T=OSTERB. TUBE some 30 to 45% 5-9 Lc UN=ROCK CORE mostly >50% 30-49			5-9 Lo 30-49		3-4 Soft, 5-8 M/Stiff, 9-1 16-30 V-Stiff, 31+ Hai		
IVOIN-	NOON OO	_ I	1103tly 20076	30-49	DOTISC SUT VELY DELISE	10-00 V-0till, 31+ Hal	u	



STE LOCATION:	PROJE	CT: Mas	SDOT S	Silver Line E	xtension				EET	BORING NO.
Chelsea, MA	SITE L	OCATION:				JOB NO.: 60242256		1 of 4		B-48
DRILL RIG: ATV Mobile B-48, Auto Hammor DRILLER: Wayne Tucker, Tim Tucker FilmSHED: 12/23/2013		MB	TA Right	of Way		LOCATION:		Elevation	on: To	tal Depth:
DRILL RIG: ATV Mobile B-48, Auto Hammer DRILLER: Wayne Tucker, Tim Tucker FINISHED: 12/26/2013		(Chelsea,	MA		N 2970007 E 780140			9'	71.0'
Hole Size : HW Casing - 4* ID	DRILL	CONTRAC	TOR:	Northern Dri	II Service	ENG: William Checchi			N:	12/23/2013
HW Casing -4" ID 12/23/13 rain 32 F, 12/26/13 cloudy 25 F Rotary Wash with Roller Bit Dirilling Fluid: Top of Rock (Depth):	DRILL	RIG: A	TV Mobil	e B-48, Auto I	Hammer	DRILLER: Wayne Tucker, Tim Tucke	r	FINISH	IED :	12/26/2013
Drilling Method : Rotary Wash with Roller Bit	Hole Si	ze:		Weather:						
Depth Sample N Blow Court Sample (first) Sample N Value Ger 6 in) Sample (ger 6 in) (g			ID		12/23/13		N	/leasure	d @ 4.7' b	gs (2/22/14)
Depth Type/No. Value Blow Count Sample (per 6 in.) Sw Sw Sw Sw Sw Sw Sw S	Drilling	Method :				Drilling Fluid :	Top of Roo	` .	•	
Chest Ches		Rotary \	Vash wi	th Roller Bit		Water		No	ot Encount	tered
BULK SAMPLE SAMPL		-			Recovery					REMARKS
BULK SAMPLE							VEL and SAND,		Air Knife to	6'bgs (12/17/13)
Moist to wet, light brown SAND, little gravel and clay SC		BULK							gravel 52.59	
Moist to wet, light brown SAND, little gravel and clay SPT-1 15 12-6 9-7 SPT-2 9 7-7 0 SPT-2 9 7-7 0 SPT-3 20 4-10 10" Moist, brown olive CLAY, trace fine sand and silt, very stiff CL SAMPLE TYPES: SPT-4 6 2-2 24" Moist, olive gray CLAY, trace silt, medium stiff SPT-2 SAMPLE TYPES: SPT-2 SPLIT SPOON SS3-3" SPLIT SPOON OT=OSTERB. TUBE Moist to wet, light brown SAND, little gravel and silt, light brown CLAY light brown SAND, little gravel and silt, light brown clive CLAY light brown SAND, little gravel and silt, light brown clive CLAY, little gravel and silt, little gravel and silt, little gravel and silt, little gravel and silt, little gravel and silt little gravel a		SAMPLE				Dry, light brown SAND, little gravel and tra	ace silt	SW		
SPT-1 15 12-6 10° 9-7 10° 10° 10° 10° 10° 10° 10° 10° 10° 10°	5					Moist to wet, light brown SAND, little grave	el and clay	sc		
15 SPT-2 9 7-7 0 after SPT-2, pushed 3' spoon from 9' to 11', no recovery light brown sand, few gravel and silt wash Approve/Date SPT-2 SPT-3 20 4-10 10" Moist, brown olive CLAY, trace fine sand and silt, very stiff CL CL SAMPLE TYPES: trace 0 to 5% SPT Resistance SPT-2' SPLIT SPOON SS3=3' SPLIT SPOON OT=OSTERB. TUBE Some 30 to 45% 5-9 Loose 10-29 Med. Dense Cohesive Consistency 0-2 Very Solt 3-4 Solt, 5-8 MStiff, 9-15 Stiff STIFE STIFF		SPT-1	15	12-6	10"		ilt, light brown	SM		
10				9-7						
SPT-3 20 4-10 10" Moist, brown olive CLAY, trace fine sand and silt, very stiff CL cleanout and SPT-3 (12/23/13) Roller Bit open hole from 14' to 69'bgs SPT-4 6 2-2 24" Moist, olive gray CLAY, trace silt, medium stiff CL SAMPLE TYPES: SPT-2" SPLIT SPOON SS3=3" SPLIT SPOON OT=OSTERB. TUBE 15 to 25% some 30 to 45% 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M'Stiff, 9-15 Stiff	10	SPT-2	9		0				from 9' to 1	i', no recovery
SPT-3 20 4-10 10" Moist, brown olive CLAY, trace fine sand and silt, very stiff CL Roller Bit open hole from 14' to 69'bgs				21					wasii	
SPT-3 20 4-10 10"										
10-10	15	SPT-3	20	4-10	10"	inioist, brown olive CLAY, trace fine sand a	and silt, very stiff	CL		
SPT-4 6 2-2 24" Moist, olive gray CLAY, trace silt, medium stiff CL		J	_0	10-10					Roller Bit op	oen hole from 14' to 69'bgs
SAMPLE TYPES: trace 0 to 5% SPT Resistance Approve/Date SPT=2" SPLIT SPOON few 5 to 10% 5 to 10% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft OT=OSTERB. TUBE 30 to 45% 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff										
SAMPLE TYPES: trace 0 to 5% SPT Resistance Approve/Date SPT=2" SPLIT SPOON few 5 to 10% 5 to 10% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft OT=OSTERB. TUBE 30 to 45% 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	-									
SAMPLE TYPES: trace 0 to 5% SPT Resistance Approve/Date SPT=2" SPLIT SPOON few 5 to 10% 5 to 10% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft OT=OSTERB. TUBE 30 to 45% 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	-									
SAMPLE TYPES: trace 0 to 5% SPT Resistance Approve/Date SPT=2" SPLIT SPOON few 5 to 10% 5 to 10% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft OT=OSTERB. TUBE 30 to 45% 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff										
SPT=2" SPLIT SPOON few 5 to 10% SS3=3" SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose 0.2 Very Soft 0.29 Med. Dense 0.3 do 45% Cohesive Consistency 0-2 Very Soft 0.3 do 45% 30 to 45% 5-9 Loose 0.29 Med. Dense 0.3 do 45% 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff	20	SPT-4	6	2-2	24"	Moist, olive gray CLAY, trace silt, medium	stiff	CL		
SS3=3" SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft OT=OSTERB. TUBE 30 to 45% 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff						SPT Resistance				Approve/Date
OT=OSTERB. TUBE some 30 to 45% 5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff					O-b	oes Density 0.4 Venul cose			0-"	



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension			SHE	ET BORING NO.
SITE I	_OCATION:				JOB NO.: 60242256			4 B-48
	MB	ΓA Right	of Way		LOCATION:		Elevation	n: Total Depth:
	(Chelsea,	MA		N 2970007 E 7	'80140	7.9	71.0'
5 11					0.4451.5		4.OT14	
Depth	-	N	Blow Count	Sample	SAMPLE		ASTM	REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)	DESCRIPTION		Class.	
	SPT-4	6	4-4	24"	Moist, olive gray CLAY, medium stiff		CL	
	3F1-4	6	4-4	24				
	1							
25_			2-2		Moist, olive CLAY, medium stiff		CL	
25	SPT-5	5	3-2	8"				
			3-2					
					Moist, olive CLAY, very soft		CI	
30	SPT-6	0	woh/24"	24"			CL	
					Marian alian Ol AV			
35	OT-1	0	طمييم لمبيط	00"	Moist, olive CLAY, very soft		CL	
	01-1	0	Hyd push	23"				
40					Moist, olive CLAY, very soft		CL	
40	SPT-7	0	woh/24"	24"				
	007.0		l. /0 4 !!	0.4"	Live in all all all all all all all all all al			
45	SPT-8	0	woh/24"	24"	Moist, olive CLAY, very soft		CL	
	E TYPES:	trac			SPT Resistance	ce		Approve/Date
	SPLIT SPOO			Cohesionles	s Density: 0-4 Very Loose	Cohesive Consistency	0-2 \/an/	Soft
	TERB. TUBE		ne 30 to 45%			3-4 Soft, 5-8 M/Sti		
	OCK CORE			30-49		16-30 V-Stiff, 31		



PROJE	CT: Mas	sDOT S	Silver Line E	xtension		SHE	ET	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256	3 of	f 4	B-48
	MBT	TA Right	of Way		LOCATION:	Elevation	on: To	tal Depth:
	(Chelsea	, MA		N 2970007 E 780140	7.9	9'	71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION	ASTM Class.		REMARKS
	SPT-8	0	woh/24"	24"	Moist, olive CLAY, very soft	CL		
50	- SPT-9	0	woh/24"	24"	Moist, olive CLAY, very soft	CL		
55	- SPT-10	7	2-3 4-4	0	Moist, olive CLAY, silt and fine sand lenses, medium stiff	CL), pushed 3" spoon 6', 24" recovery
60_	- SPT-11	0	woh/24"	24"	Moist, olive CLAY, silt and fine sand lenses, very soft	CL		
65	- SPT-12	0	woh/24"	24"	Moist, olive CLAY, very soft	CL		
	SPT-13 TYPES:	0 trac		24"	Moist, olive CLAY, silt and fine sand lenses, very soft SPT Resistance	CL		Approve/Date
	SPLIT SPOO			O-b	Destina 0.4 Vender	0.637	0-//	
OT=OS	SPLIT SPOC TERB. TUBE	son	ne 30 to 45%	5-9 Lo	ose 10-29 Med. Dense 3-4 Soft, 5-8 M.	Stiff, 9-15 S	-	
RUN=R	OCK CORE	mo	stly >50%	30-49	Dense 50+ Very Dense 16-30 V-Stiff,	31+ Hard		



PROJE	ROJECT: MassDOT Silver Line Extension									EET	BORING NO.
SITE I	OCATION:				JOB NO.: 60242256			4 of 4		B-48	
	MB	TA Right	of Way		LO	CATION:			Elevation:		Total Depth:
	(Chelsea,	, MA			N 2970007	E 7	80140	7.	9'	71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		D	SAMPLE ESCRIPTION		ASTM Class.		REMARKS
71	SPT-13	0	woh/22"-1	24"		Moist, olive CLAY, sili	and fine sand lens	ses, very soft	CL		
75					-	End of Boring @ 71.0	' bgs			from 16'	e and cement Grout placed to 71' bgs (12/23/13) I screen set from 5' to 15' bgs, onite seal from 4' to 5' bgs
80					-						(12/26/13)
85_					-						
90					-						
					-						
	AMPLE TYPES: trace 0 to 5% PT=2" SPLIT SPOON few 5 to 10%		SPT Resistance		ce			Approve/Date			
	SPLIT SPO			Cohesionles	ss Dei	sity: 0-4 Very Loos	Se.	Cohesive Consistency	v ()-2 \/ei	v Soft	-
	S3=3" SPLIT SPOON little 15 to 25% Cohesionless T=OSTERB. TUBE some 30 to 45% 5-9 Loc				10-29 Med. De		3-4 Soft, 5-8 M/S	_			
RUN=ROCK CORE mostly >50% 30-49 De						16-30 V-Stiff, 3					



PROJE	CT: Mas	ssDOT \$	Silver Line E	xtension		SHE	EET BORING NO.
SITE I	OCATION:				JOB NO.: 60242256	1 of	f 4 B-49
	MB	ΓA Right	of Way		LOCATION:	Elevation	on: Total Depth:
	(Chelsea	, MA		N 2970051 E 780153	7.3	3' 71.0'
DRILL	CONTRAC	TOR :	Northern Dri	II Service	ENG: William Checchi	BEGUN	N: 12/26/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DRILLER: Tim Tucker	FINISH	IED: 12/27/2013
Hole S	ize:		Weather:		Grou	nd Water (Dep	oth/Elev.):
	V Casing - 4'	' ID		12/26/13	cloudy 34 F, 12/27/13 cloudy 25 F		bgs (12/26/13)
Drilling	Method :				Drilling Fluid : Top o	of Rock (Depth	n):
	Rotary \	Nash wi	th Roller Bit		Water	No	ot Encountered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION	ASTM Class.	REMARKS
	Пиле				Dry, roadbed ballast stone and black GRAVEL and SA little silt	AND, GM to SM	Air Knife to 6'bgs (12/19/13)
					FILL		
5	-				Moist, light brown GRAVEL and SAND, little silt	GM to SM	3" Roller bit and HW Casing
							4" Roller bit, Casing refusal Casing removed, 5" Roller bit to 9' thru
							gravels and cobbles, brown peat and wood in wash HW Casing to 9' bgs
10_	SPT-1	2	2-1	0	Wet, dark olive CLAY, little peat, trace sand and silt, v soft	/ery CL	after SPT-1, pushed 3" spoon from 9' to 11', 12" recovery
			1-1				
_							casing pushed to 13' bgs driven to 14' bgs
15_	OT-1	-	Hyd push	9"	Dry, olive CLAY, trace silt and wood, medium dense	CL	wood pushed into SPT sample
	SPT-2	13	3-5-8-9	24"			
20	SPT-3	6	2-2	24"	Moist, olive CLAY, trace silt, loose	CL	
	E TYPES:	trac	e 0 to 5%	,	SPT Resistance	<u> </u>	Approve/Date
SPT=2"	SPT=2" SPLIT SPOON few 5 to 10%						
	SPLIT SPOO				ess Density: 0-4 Very Loose Cohesive Consistency		
					9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff		Stiff
KUN=R	OUR CORE	lmo:	stly >50%	30-49	Dense 50+ Very Dense 16-30 V-S	Stiff, 31+ Hard	



SPT-8 0 woh/20" 24" Moist, olive CLAY, very soft CL	PROJE	CT: Mas	ssDOT S	Silver Line E	xtension				SHEET	BORING NO.
Most	SITE L	OCATION:				JOB NO.: 60242256			2 of 4	B-49
Depth Sample N Blow Cours Sample Recovery DESCRIPTION Class. REMARKS		MB	ΓA Right	of Way					Elevation:	Total Depth:
(ft) Type/No. Value (per 6 in.) Recovery (inches) SPT-3 6 4-4 24* Moist, olive CLAY, trace silt, medium stiff CL SPT-4 0 2 24* SPT-5 0 2 24* SPT-5 0 2 24* Moist, olive CLAY, very soft CL SPT-7 0 4 3 24* Moist, olive CLAY, very soft CL SPT-7 0 4 24* Moist, olive CLAY, very soft CL ADDITION Class. RECOVERY (inches) Moist, olive CLAY, very soft CL ADDITION Class. RECOVERY (inches) Moist, olive CLAY, very soft CL ADDITION Class. RECOVERY (inches) CL ADDITION Class. RECOVERY (inches) ADDITION Class. RECOVERY (inches) CL ADDITION Class. ADDITION Class. RECOVERY (inches) CL ADDITION Class. ADDITION CLAY. AD		(Chelsea	, MA		N 2970051	E 78	80153	7.3'	71.0'
SPT-3 6	-				Recovery					REMARKS
25 SPT-4 0 2 24* 30 SPT-5 0 woh/20* 24* 35 SPT-6 0 woh/23* 24* 40 SPT-7 0 1 23* Moist, olive CLAY, very soft CL Moist, olive CLAY, very soft CL SPT-7 0 4 0 woh/20* SPT-7 0 1 23* Moist, olive CLAY, fine sand lens, very soft CL Approve/Date SPT-2 SPLT1 SPOON trace 0 to 5% SPT Resistance Approve/Date SST-2 SPLT1 SPOON title 15 to 25% Cohesionless Density 0.4 Very Loose Cohesive Consistency 0.2 Very Soft Chasive Consistency 0.2 Very Soft Cohesive Cohes		SPT-3	6	4-4		Moist, olive CLAY, trace silt,	medium stiff		CL	
35 SPT-5 0 2 24* 40 SPT-7 0 Woh/23* 23* 40 SPT-8 0 Woh/20* 24* Moist, olive CLAY, very soft CL Moist, olive CLAY, fine sand lens, very soft CL SAMPLE TYPES: SPT-2' SPLIT SPOON tew 5 to 10% SSS=3' SPLIT SPOON little 15 to 25% Cohesionless Density. 0-4 Very Loose Cohesive Consistency 0-2 Very Soft	25	- SPT-4	0		24"	Moist, olive CLAY, very soft			CL	
35 SPT-6 0 3 24" 40 SPT-7 0 Woh/23" 23" Moist, olive CLAY, fine sand lens, very soft CL SPT-8 0 Woh/20" 24" Moist, olive CLAY, very soft SPT-8 0 Woh/20" 24" Moist, olive CLAY, very soft SAMPLE TYPES: SPT-8:	30	- SPT-5	0		24"	Moist, olive CLAY, very soft			CL	
40 SPT-7 0 1 23" SPT-7 0 1	35	SPT-6	0		24"	Moist, olive CLAY, very soft			CL	
SAMPLE TYPES: trace 0 to 5% SPT Resistance Approve/Date SPT=2" SPLIT SPOON few 5 to 10% SS3=3" SPLIT SPOON little 15 to 25% Cohesionless Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft	40	SPT-7	0		23"	Moist, olive CLAY, fine sand	lens, very so	oft	CL	
	SAMPLE SPT=2"	TYPES: SPLIT SPO	trac ON few	e 0 to 5% 5 to 10%		SPT				
UI=USIERB. IUBE							<u> </u>		•	t



PROJ	ECT: Ma	ssDOT S	Silver Line E	xtension		SHEET	BORING NO.
SITE	LOCATION:				JOB NO.: 60242256	3 of 4	B-49
	MB	ΓΑ Right	t of Way		LOCATION:	Elevation:	Total Depth:
	(Chelsea	, MA		N 2970051 E 780153	7.3'	71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery	SAMPLE DESCRIPTION	ASTM Class.	REMARKS
				(inches)			
-	SPT-8	0	2	24"	Moist, olive CLAY, very soft	CL	
50_	SPT-9	0	woh/23"	24"	Moist, olive CLAY, very soft	CL	
55	SPT-10	0	woh/24"	24"	Moist, olive CLAY, silt and fine sand lenses, very sof	t CL	
60_	SPT-11	0	woh/24"	24"	Moist, olive CLAY, silt and fine sand lenses, very so	ft CL	
65	SPT-12	0	woh/20"	24"	Moist, olive CLAY, very soft	CL	
	SPT-13 LE TYPES:	0 trac		24"	Moist, olive CLAY, silt and fine sand lenses, very sof SPT Resistance	t CL	Approve/Date
	SPLIT SPO			Cohesionles	ess Density: 0-4 Very Loose Cohesive Consistency 0-2 Very Soft		
					0 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff		
KUN=R	=ROCK CORE mostly >50% 30-4				Dense 50+ Very Dense 16-30 V	-Stiff, 31+ Hard	



PRO	JECT: Ma	ssDOT	Silver Line E	xtension					SHE	ET	BORING NO.
SITE	LOCATION				JOB NO.: 60242256				4 of	4	B-49
	MB	TA Righ	t of Way		LOCA	TION:			Elevation	on:	Total Depth:
		Chelsea	, MA		N	2970051	E 7	80153	7.3	3'	71.0'
Dept		N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMI DESCRI			ASTM Class.		REMARKS
71	SPT-13	-	3	24"	Mo	oist, olive CLAY, silt and fin	e sand lens	es, loose	CL		
75					Er	d of Boring @ 71.0' bgs				bentonite from 0' to	and cement Grout placed 71' bgs (12/27/13)
,					- - -						
80_					- - - -						
85_					- - -						
90_					- - - -						
					 - - - -						
SAMP	LE TYPES:	trac	ce 0 to 5%			SPT	Resistanc	е	!		Approve/Date
	2" SPLIT SPO										
	B" SPLIT SPO							Cohesive Consistency	-		
	OT=OSTERB. TUBE some 30 to 45% 5-9 Lo				10-29 Med. Dense		3-4 Soft, 5-8 M/St		Stiff		
IZON=	JN=ROCK CORE mostly >50% 30-4				Dense	50+ Very Dense		16-30 V-Stiff, 3	ı+ mard		



PROJE	PROJECT: MassDOT Silver Line Extension							ET	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256	1 of 4		B-50	
	MBT	ΓA Right	of Way		LOCATION:		Elevation	on: To	tal Depth:
	(Chelsea,	MA		N 2970073 E 78007	0	7.0'		84.0'
DRILL	CONTRAC	TOR:	Northern Dr	ill Service	ENG: William Checchi			N:	12/27/2013
DRILL	RIG: A	TV Mobi	e B-48, Auto I	Hammer	DRILLER: Tim Tucker	FINISH	IED :	12/30/2013	
Hole Siz	ze:		Weather:			Ground Wa	ater (Dep	oth/Elev.)	
HV	/ Casing - 4"	ID		12/27/13	cloudy 30 F, 12/30/13 cloudy 30 F		6'	bgs (12/2	7/13)
Drilling	Method :				Drilling Fluid :	Top of Roc	k (Depth	າ) :	
	Rotary \	Nash wi	th Roller Bit	T	Water		No	ot Encount	ered
Depth (ft)					SAMPLE DESCRIPTION				REMARKS
					Dry, roadbed ballast stone and black GRAVEL little silt	and SAND,	GM to SM	Air Knife to	6'bgs (12/19/13)
	BULK SAMPLE				FILL			Chloride an	30,991 ohm-cm d Sulfate not detected, stilled water)
5					Moist, light brown GRAVEL and SAND, little si	t	GM to SM		
					Moist, brown PEAT, trace sand, silt, and clay,	verv soft	PT	brown sand Moisture co	, silt, peat wash ntent 108%
10	SPT-1	0	woh/18"	18"	Moist, brown gray CLAY, trace silt and peat, ve		CL		
15	SPT-2	8	3-3 5-6	22"	Moist, light brown CLAY, few silt, medium stiff		CL	Moisture co Plastic limit Plastic inde	23, Liquid limit 49,
	OT-1	-	Hyd push	24"	Moist, olive CLAY		CL	Moisture co	ntent 35.9%
20 SAMPLE	TYPES:	troo							Approve/Date
	: TTPES. SPLIT SPO(trac ON few			SPT Resistance				Αρριονέ/Date
	SPLIT SPOC			Cohesionles	ess Density: 0-4 Very Loose Cohesive Consistency			y Soft	
OT=OST	ERB. TUBE	som	ne 30 to 45%	5-9 Lo					
RUN=R0	OCK CORE	mos	stly >50%	30-49	Dense 50+ Very Dense 16	i-30 V-Stiff, 31	1+ Hard		



PROJE	ECT: Mas	ssDOT S	Silver Line E	xtension		SH	EET	BORING NO.
SITE	LOCATION:				JOB NO.: 60242256	2 0	of 4	B-50
	MB	ΓΑ Right	t of Way		LOCATION:	Elevati	ion: To	tal Depth:
	(Chelsea	, MA		N 2970073 E 78	30070 7.	.0'	84.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION	ASTM Class.		REMARKS
	OT-1	-	Hyd push	24"	Moist, olive gray CLAY	CL	Moisture cor	ntent 35.9%
25_	SPT-3	0	woh/24"	24"	Moist, olive CLAY, very soft	CL		
30	SPT-4	0	woh/24"	24"	Moist, light gray CLAY, very soft	CL	Moisture coi	ntent 41.1%
35	SPT-5	0	woh/24"	24"	Moist, olive CLAY, very soft	CL		
40	SPT-6	0	woh/24"	16"	Moist, light brown gray CLAY, very soft	CL	Moisture co Plastic limit : Plastic index	23, Liquid limit 46
45 SAMPL	SPT-7	0 trac	woh/24" ce 0 to 5%	20"	Moist, olive CLAY, very soft SPT Resistance	CL e		Approve/Date
	SPLIT SPO							
SS3=3" SPLIT SPOON little 15 to 25% Cohesionles					· ·	Cohesive Consistency 0-2 Ve		
	OT=OSTERB. TUBE some 30 to 45% 5-9 Lo					3-4 Soft, 5-8 M/Stiff, 9-15	Stiff	
NON=R	N=ROCK CORE mostly >50% 30-4				Dense 50+ Very Dense	16-30 V-Stiff, 31+ Hard		



PRO	JECT: Ma	ssDOT \$	Silver Line E	xtension		SHE	ET BORING NO.
SITE	LOCATION				JOB NO.: 60242256	3 of	f 4 B-50
	MB	TA Right	of Way		LOCATION:	Elevation	on: Total Depth:
		Chelsea	-		N 2970073 E 780070	7.0	0' 84.0'
			,		W 2010010		00
Dept	h Sample	N	Blow Count	Sample	SAMPLE	ASTM	REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery	DESCRIPTION	Class.	KLWAKKS
				(inches)			
	SPT-7	0	woh/24"	20"	Moist, olive CLAY, very soft	CL	
			woh/23"		Moist, olive CLAY, silt and fine sand lenses, very soft	CL	
50_	SPT-8	0		24"		02	
			1				
55					Moist, olive CLAY, silt and fine sand lenses, very soft	CL	Moisture content 25.9
55_	SPT-9	0	woh/24"	24"			
					Moist, olive CLAY, very soft		
60	OT-2	_	Hyd push	23"	Moist, onve deat, very soit	CL	
	01-2		Tiya pasii	25		OL.	
					Moist, olive CLAY, very soft	01	
65_	SPT-10	0	woh/24"	16"	•	CL	
70	SPT-11	1	1-1	2"	Moist, olive CLAY, very soft	CL	
	LE TYPES:	trac	ce 0 to 5%		SPT Resistance		Approve/Date
SPT=2	2" SPLIT SPO	ON few	5 to 10%				
SS3=3	B" SPLIT SPO	ON little	e 15 to 25%	Cohesionles	s Density: 0-4 Very Loose Cohesive Consist	ency 0-2 Ver	y Soft
						M/Stiff, 9-15 S	Stiff
RUN=	=ROCK CORE mostly >50% 30-49			30-49	Dense 50+ Very Dense 16-30 V-Stiff,	31+ Hard	



B-50 Depth: 84.0' EMARKS
84.0' EMARKS en hole to 84' bgs
EMARKS en hole to 84' bgs
en hole to 84' bgs
en hole to 84' bgs
en hole to 84' bgs
), 12/30/13)
cement Grout placed gs (12/30/13)
Approve/Date



PROJE	CI: Mas	SSDOT S	Silver Line E	xtension				SHE	:E1	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256				4	B-51
	MBT	ΓA Right	of Way		LO	CATION:		Elevation	n: To	tal Depth:
	(Chelsea,	MA			N 2970034 E 78004	8	7.3	3'	71.0'
DRILL	CONTRAC	TOR:	Northern Dri	Il Service	ΕN	G: William Checchi		BEGUN:		1/6/2014
DRILL	RIG: A	TV Mobil	e B-48, Auto H	Hammer	DR	ILLER: Tim Tucker	FINISHED: 1/6/2014			
Hole Siz	ze:		Weather:				Ground Wa	ter (Dep	th/Elev.)	
HW	Casing - 4	" ID		(01/0	6/14 cloudy-rain 45 F		5'	bgs (12/1	9/13)
Drilling I	Drilling Method :					lling Fluid :	Top of Roc	k (Depth):	
	Rotary \	Nash wi	th Roller Bit			Water		No	t Encoun	tered
Depth	Sample	N	Blow Count	Sample		SAMPLE		ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)		DESCRIPTION		Class.		
				(1101100)		Dry, roadbed ballast stone and black GRAVEL	and SAND,		Air Knife to	6' bgs (12/19/13)
_						few silt				
									Hazmat san	mple
						FILL		GW to	Hazmat san	
								SW	Hazmat san	npie
_									HW casing	pushed 0' to 6' bgs
5									Brown aray	el and sand wash
									Drown grav	or and sand wasn
			2-1							
	SPT-1	2		0					HW casing	pushed 6' to 9' bgs
			1-1					ы		- -
									brown to rewash	d-brown sand and PEAT
10	CDT 0	4	woh/14"	40"		Wet, dark brown PEAT, very soft		011		
	SPT-2	1	1-3	18"		Moist, brown-gray CLAY, few peat, very soft		ОН		
			1-3			Moist, blue-gray CLAY, trace peat, very soft				
						Moist olive CLAY, stiff		CL		
15	SPT-3	11	4-4	10"						
			7-7							
-										
20 SPT-4 7 2-4 4"					Moist, olive CLAY, medium stiff			CL		
SAMPLE TYPES: trace 0 to 5%					SPT Resistance					Approve/Date
SPT=2" SPLIT SPOON few 5 to 10%						T				-
	SS3=3" SPLIT SPOON little 15 to 25% Cohesionle									
					Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/S 9 Dense 50+ Very Dense 16-30 V-Stiff, 3					



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension		SHI	EET E	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256	2 0	of 4	B-51
	MBT	ΓΑ Right	t of Way		LOCATION:	Elevati	on: Tota	al Depth:
	(Chelsea	, MA		N 2970034 E 78	80048 7.	.3'	71.0'
Depth	-	N	Blow Count	Sample	SAMPLE	ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)	DESCRIPTION	Class.		
-	SPT-4	7	3-4	4"	Moist, olive CLAY, medium stiff	CL	Roller bit - op	en hole
25	- SPT-5	0	woh/18" 3	24"	Moist, olive CLAY, very soft	CL		
30	OT-1	-	hydraulic push tube	24"	Moist, olive CLAY, very soft	CL		
35	SPT-6	0	woh/24"	24"	Moist, olive CLAY, very soft	CL		
40	SPT-7	0	woh/18"	- 24"	Moist, olive CLAY, very soft	CL		
	SPT-8 E TYPES:	0 trac		24"	Moist, olive CLAY, fine sand lenses, very SPT Resistanc			Approve/Date
	PT=2" SPLIT SPOON few 5 to 10% S3=3" SPLIT SPOON little 15 to 25% Cohesionles				s Density: 0-4 Very Loose	Cohesive Consistency 0-2 Ve	sistency 0-2 Very Soft	
	T=OSTERB. TUBE some 30 to 45% 5-9 Lo				<u> </u>	3-4 Soft, 5-8 M/Stiff, 9-15	-	
RUN=R				30-49	Dense 50+ Very Dense	16-30 V-Stiff, 31+ Hard		



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension			SHE	ET	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256		3 of	4	B-51
	MB	ΓA Right	of Way		LOCATION:		Elevation	on: To	al Depth:
	(Chelsea	, MA		N 2970034 E	780048	7.3	3'	71.0'
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery	SAMPLE DESCRIPTION		ASTM Class.	•	REMARKS
				(inches)					
	SPT-8	0	woh/24"	24"	Moist, olive CLAY, fine sand lenses, ve	ry soft	CL	Roller bit- op	en hole
50	- SPT-9	0	woh/24"	12"	Moist, olive CLAY, very soft		CL		
55_	- SPT-10	0	woh/24"	14"	Moist, olive CLAY, very soft		CL		
60_	- SPT-11	0	woh/24"	24"	Moist, olive to light gray CLAY, very sof	it	CL		
65_	- OT-2	-	hydraulic push tube	24"	Moist, olive CLAY, very soft		CL		
70	SPT-12	0	woh/18"	24"	Moist, light gray CLAY, silt and fine san		CL		
	E TYPES:	trac			SPT Resistance				Approve/Date
	SPT=2" SPLIT SPOON few 5 to 10%				less Density: 0.4 Very Losse Cobasiva Consistent			v Soft	
					onless Density: 0-4 Very Loose Cohesive Consistency Cohesive Consistency 9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 WStiff,				
					Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/ 49 Dense 50+ Very Dense 16-30 V-Stiff,				



PROJ	PROJECT: MassDOT Silver Line Extension								SHEET		BORING NO.	
SITE	LO	CATION:				JOB NO.: 60242256				4 0	f 4	B-51
		MB	TA Right	of Way		LO	CATION:			Elevation	on: 7	Total Depth:
		(Chelsea	, MA			N 2970034	E 7	'80048	7.	3'	71.0'
Dept		Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)			SAMPLE SCRIPTION		ASTM Class.		REMARKS
71		SPT-12	0	1	24"		Moist, light gray CLAY,	silt and fine sand	l lenses, very soft	CL		
75							End of Boring @ 71.0' b	gs			bentonite placed 0'	and cement Grout to 71' bgs
75_												
80_						-						
85_						-						
90_						<u>.</u>						
04117	Щ	T)/D52	I.	0: 50:				ODT Desist		<u> </u>		A manuar - /D = 1 =
	SAMPLE TYPES: trace 0 to 5% SPT=2" SPLIT SPOON few 5 to 10%			SPT Resistance					Approve/Date			
SS3=3" SPLIT SPOON little 15 to 25% Cohesionles				ess Density: 0-4 Very Loose Cohesive Consistence			stency 0-2 Very Soft					
OT=OSTERB. TUBE some 30 to 45% 5-9 Lo			5-9 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/Stiff, 9-15 Stiff									
RUN=	UN=ROCK CORE mostly >50% 30-49				Dens	e 50+ Very Dense		16-30 V-Stiff, 3	31+ Hard			



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	:E1	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256				1	B-52
	MB	ΓΑ Right	of Way		LO	CATION:		Elevation	n: To	tal Depth:
	(Chelsea	MA			N 2970105 E 77994	3	6.9	9'	12.0
DRILL	CONTRAC	TOR:	Northern Dri	II Service	ENG: William Checchi			BEGUN:		12/30/2013
DRILL	RIG:	ATV Mobi	le B48, Auto F	lammer	DR	RILLER: Tim Tucker	FINISHED: 12/30/2013			
Hole Siz	ze:		Weather:				Ground Wa	ter (Dep	th/Elev.)	:
	3.25" ID			12	2/30	/13 partly cloudy 35 F		6.0	bgs (12/	30/13)
Drilling	Method :				Dri	lling Fluid :	Top of Roc	k (Depth):	
	Hol	low Sten	n Auger			None		No	t Encoun	tered
Depth (ft)						SAMPLE DESCRIPTION		ASTM Class.		REMARKS
-						Dry, ballast stone and black GRAVEL and SAN	ID, little silt	GM to SM	Hand augei	to 6' bgs (12/19/13)
5						Moist, light brown GRAVEL and SAND, few sill		GM to SM		
	SPT-1	0	woh/24"	16"		Wet, brown SILT, some sand, few peat, loose		МН	fines 54.3%	s, sand 44.1%,
						Moist, brown CLAY, trace sand and peat, very	soft	CL	Plastic limit Plastic inde Organic coi	
10	SPT-2	12	3-4	14"		Dry, olive gray CLAY, trace peat, stiff		CL		
			8-12			5 1 4 5 1 0 40 0H				
						End of Boring @ 12.0' bgs				
15										
										T
SAMPLE TYPES: trace 0 to 5% SPT=2" SPLIT SPOON few 5 to 10%						SPT Resistance				Approve/Date
	SPLIT SPOO SPLIT SPOO			Cohesionis	ass Density: 0.4 Very Lossa Cohesiya Cossistansi			, 0-2 \/c=	v Soft	-
					Loose 10-29 Med. Dense Cohesive Consistence 2-4 Very Loose 3-4 Soft, 5-8 M/S			-		
					Dense 50+ Very Dense 16-30 V-Stiff, 3					



PROJE	ROJECT: MassDOT Silver Line Extension									BORING NO.	
SITE L	OCATION:			JOB NO.: 60242256				1 of	f 1	B-53	
	MBT	TA Right	of Way		LO	CATION:		Elevation	on: To	tal Depth:	
	(Chelsea	, MA			N 2970065 E 77988	9	6.3	3'	12.0	
DRILL (CONTRAC	TOR :	Northern Dri	Il Service	ENG: William Checchi			BEGUN:		12/31/2013	
DRILL	RIG: A	ATV Mob	ile B48, Auto F	lammer	DR	ILLER: Tim Tucker	FINISHED: 12/31/2013				
Hole Siz	ze :		Weather:				Ground Wa	ater (Dep	oth/Elev.)	:	
3.25" ID						/31/13 cloudy 16 F	5.0	5.0' bgs (12/31/13)			
Drilling Method :					Dri	ling Fluid :	Top of Roc	k (Depth	n) :		
	Holl	ow Sten	n Auger			None		No	t Encoun	tered	
						0.110.5					
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery		SAMPLE DESCRIPTION		ASTM Class.		REMARKS	
(11)	1 9 0 0 1 10 .	value	(por o)	(inches)		DECORN HON		Olass.			
						Dry, ballast stone and black GRAVEL and SA	ND, little silt		Air Knife to	6' bgs (12/19/13)	
								GM to			
_								SM			
						FILL					
_								GM to			
5								SM			
						Maria De la Companya					
	CDT 4	0		00"		Wet, brown PEAT, little silt, very soft		PT		537 ohm-cm ntent= 3700 mg/kg	
	SPT-1	0	woh/24"	20"					Sulfate con	tent= 5000 mg/kg	
									pH= 7.1 (ai:	stilled water)	
_											
10											
			4-9			Moist, olive to light brown CLAY, trace silt, ver	y stiff	CL			
	SPT-2	20		16"							
			11-15								
						End of Boring @ 12.0' bgs					
15											
15											
<u> </u>											
SAMPLE TYPES: trace 0 to 5%						SPT Resistance				Approve/Date	
	SPT=2" SPLIT SPOON few 5 to 10%										
	SS3=3" SPLIT SPOON little 15 to 25% Cohesionles							=			
	ST=SHELBY TUBE some 30 to 45% mostly >50%				0 Loose 10-29 Med. Dense 3-4 Soft, 5-8 M/S -49 Dense 50+ Very Dense 16-30 V-Stiff, 3						



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	:E1	BORING NO.		
SITE L	OCATION:				JOB NO.: 60242256				1	B-54		
	MB	ΓΑ Right	of Way		LO	CATION:		Elevation	n: To	tal Depth:		
	(Chelsea	, MA			N 2970092 E 77983	7	7.	1'	12.0		
DRILL	CONTRAC	TOR :	Northern Dr	ill Service	ENG: William Checchi			BEGUN:		12/31/2013		
DRILL	RIG:	ATV Mobi	ile B48, Auto H	Hammer	DRILLER: Tim Tucker FINISHE					12/31/2013		
Hole Siz	ze:		Weather:				Ground Wa	ater (Dep	th/Elev.)	:		
	3.25" ID				12	2/31/13 cloudy 18 F		5'	5' bgs (12/31/13)			
Drilling	Method :				Dri	lling Fluid :	Top of Roc	k (Depth):			
	Hol	low Sten	n Auger			None		No	t Encoun	tered		
Depth	Sample	N	Blow Count	Sample		SAMPLE		ASTM		REMARKS		
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)		DESCRIPTION		Class.				
				()		Dry, ballast stone and black GRAVEL and SA	ND, little silt		Air Knife to	6' bgs (12/19/13)		
									7 7	0 2g0 (1 <u>2</u> 7.07.07		
	BULK					FILL		GM to				
	SAMPLE							SM				
5												
			woh/12"			Wet, brown PEAT, some silt and clay, very so	ft	PT				
	SPT-1	1	1/12"	20"								
			1/12									
10												
			44.0			Dry, olive CLAY, trace silt, very stiff		CL				
	SPT-2	18	14-8	22"								
			10-12									
						End of Boring @ 12.0' bgs						
<u>, </u>												
15					1							
					_							
SAMPLE TYPES: trace 0 to 5%					SPT Resistance					Approve/Date		
SPT=2" SPLIT SPOON few 5 to 10%						ı						
	SS3=3" SPLIT SPOON little 15 to 25% Cohesionle:							-				
	SHELBY TUBE some 30 to 45% 5-9 LIN=ROCK CORE mostly >50% 30-49				_oose							
		10	. ,		11					i e		



PROJE	CI: Mas	ssDOT S	Silver Line E	xtension				SHE	EI	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256		1 of	1	B-55
	MB	ΓΑ Right	of Way		LC	CATION:		Elevation	n: To	tal Depth:
	(Chelsea	MA			N 2970161 E 779739)	6.0	D'	12.0
DRILL	CONTRAC	TOR :	Northern Dri	II Service	ΕN	G: William Checchi		BEGUN	l:	12/30/2013
DRILL	RIG:	ATV Mobi	le B48, Auto H	lammer	DF	ILLER: Tim Tucker		FINISH	ED :	12/30/2013
Hole Siz	ze:		Weather:				Ground Wa	ter (Dep	th/Elev.)	
	3.25" ID				12	2/30/13 cloudy 45 F		5'	bgs (12/3	0/13)
Drilling	Method :				Dri	lling Fluid :	Top of Roc	k (Depth):	
	Hol	low Sten	n Auger			None		No	t Encoun	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
				, ,		Dry, ballast stone and black GRAVEL and SAN	D, little silt		Air Knife to	6' bgs (12/19/13)
						FILL		GM to SM		
5						Moist, light brown GRAVEL and SAND, little sil	i	GM to SM	wet drill rod	
			woh/18"			Wet, brown PEAT, some sand, silt and clay, ve	ry soft	PT		
	SPT-1	0	4	18"		Moist, olive CLAY, few peat, very soft		CL		
			-							
10										
	ODT 0	00	5-10	00"		Dry, light brown and gray CLAY, trace silt, very	stiff	CL		
	SPT-2	22	12-14	20"						
			12-14			End of Boring @ 12.0' bgs				
						Little of Borning @ 12.0 bgs				
15										
SAMPLE	TYPES:	trac	e 0 to 5%		_	SPT Resistance		I		Approve/Date
	SPLIT SPO									11
SS3=3"	SPLIT SPO	ON little	15 to 25%	Cohesionles	s De	ensity: 0-4 Very Loose Cohes	ive Consistency	0-2 Ver	y Soft	
ST=SHE	LBY TUBE	son	ne 30 to 45%	5-9 Lo	ose	10-29 Med. Dense 3-4	Soft, 5-8 M/St	tiff, 9-15 S	tiff	
RUN=RO	OCK CORE	mos	stly >50%	30-49	Den	se 50+ Very Dense 16	-30 V-Stiff, 3	1+ Hard		



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension					SHE	ET	BORING NO.
SITE L	OCATION:				JO	B NO.: 60242256			1 of	1	B-56
	MBT	ΓΑ Right	of Way		LO	CATION:			Elevation	n: To	otal Depth:
	(Chelsea	MA			N 2970084 E 7790	698		11.	.9	12.0
DRILL	CONTRAC	TOR:	Northern Dri	Il Service	ΕN	IG: William Checchi			BEGUN	l:	12/18/2013
DRILL	RIG:	ATV Mobi	le B48, Auto F	lammer	DF	RILLER: Tim Tucker			FINISH	ED:	12/18/2013
Hole Si	ze :		Weather:		ļ		G	round Wa	ter (Dep	th/Elev.)	
	3.25" ID			1:	2/18	3/13 partly cloudy 30 F			9 k	ogs' (12/1	8/13)
Drilling	Method :				Dri	lling Fluid :	To	op of Rocl	k (Depth):	
	Holl	low Sten	n Auger			None			No	t Encour	itered
Depth	Sample	N	Blow Count	Sample		SAMPLE			ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery (inches)		DESCRIPTION			Class.		
				(Dry, brown topsoil			SM		
	SPT-1	15	6-7 8-9	10"		Dry, brown SAND, little gravel and silt, medi	ium de	nse	Olvi		
			0 3			bry, brown or true, intio graver and ont, modi	ium uo	1100			
	-					FILL					
			4-5			Dry, brown GRAVEL and SAND, little silt, m	nedium	dense	GM to		
5	SPT-2	11		14"					SM		
			6-6								
	<u> </u>										
						Dry, black SAND, little gravel and silt					
						-			SM		
10	ODT 0	40	6-9	00"		Wet, light brown SAND, little silt, medium de	ense		SM		
	SPT-3	19	10-9	20"							
			10-9								
	<u> </u>				_						
			1 // 0 !!		_	Wet, light brown SAND, little silt, loose			SM		
15	SPT-4	2	woh/12"	10"		Wet, brown PEAT, little gravel, sand, silt, ar	nd red	brick			
			2-2			chips, very soft			PT		
						End of Boring @ 16.0' bgs					
_					_						
_	<u> </u>				_						
	<u> </u>										
	E TYPES:	trac				SPT Resistance					Approve/Date
	SPLIT SPO			0.1	_	0.4 V	1	0	0.637	0.4	-
	SPLIT SPOC ELBY TUBE		e 15 to 25% ne 30 to 45%	Cohesionles 5-9 Lo				Consistency oft, 5-8 M/St			
	OCK CORE			30-49				ادر ازار کار V-Stiff, 31		utt	
						-					



PROJE	CT: Mas	SSDOT S	Silver Line E	xtension	n		SHE	ET	BORING NO.
SITE L	OCATION:				JOB NO.: 60242256		1 of	1	B-57
	MBT	ΓA Right	of Way		LOCATION:	E	levatio	n: To	tal Depth:
	(Chelsea	, MA		N 2970144 E 779641		6.4	4'	17.0'
DRILL	CONTRAC	TOR:	Northern Dri	II Service	ENG: William Checchi	В	EGUN	1:	12/31/2013
DRILL	RIG:	ATV Mobi	ile B48, Auto H	Hammer	DRILLER: Tim Tucker	FI	INISH	ED:	12/31/2013
Hole S	ze:		Weather:			Ground Wate	er (Dep	th/Elev.) :	
	3.25" ID				12/31/13 cloudy 18 F		5.0'	bgs (12/1	9/13)
Drilling	Method :				Drilling Fluid :	Top of Rock ((Depth):	
	Holl	ow Sten	n Auger		None		No	t Encount	ered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)	SAMPLE DESCRIPTION		ASTM Class.		REMARKS
					Dry, black GRAVEL and SAND, few silt			Air Knife to	6' bgs (12/19/13)
					FILL		GW to	Hazmat san	nple
	Bulk							gravel 38.69	%, sand 51.2%
	Sample				Dry, tan to brown SAND, some gravel, few silt		SW	111163 10.270	
							011	Hazmat san	nple
5									
			8-8		Wet, brown SAND, some gravel, little silt, mediur	m dense	SM		
	SPT-1	10		6"	Moist, blue-gray CLAY, trace peat, medium stiff		ОН		
			2-5						
10									
	007.0		1-1		Wet, dark brown PEAT, very soft		PT		
	SPT-2	2		20"					
			1-1					h DEA	T and CLAY wash
								DIOWII PEA	r and CLAY wasn
15									
			woh/14"		Main Harry Clay Inches		PT		
	SPT-3	3		18"	Moist, blue gray CLAY, trace peat, very soft		ОН		
			3-7						
					End of Boring @ 17.0' bgs				
					7				
SAMPI	L E TYPES:	trac	e 0 to 5%		SPT Resistance				Approve/Date
	SPLIT SPO				S				
SS3=3"	SPLIT SPOO	ON little	e 15 to 25%	Cohesionles	ess Density: 0-4 Very Loose Cohesive	e Consistency	0-2 Very	y Soft	
	ELBY TUBE	son	ne 30 to 45%	5-9 Lo	Loose 10-29 Med. Dense 3-4 S	Soft, 5-8 M/Stiff,	9-15 S	tiff	
RUN=R	OCK CORE	mos	stly >50%	30-49	Dense 50+ Very Dense 16-3	0 V-Stiff, 31+	Hard		



PROJE	CI: Mas	SSDOT S	Silver Line E	xtension)				SHE	EI	BORING NO.
SITE L	OCATION:				JOE	3 NO.: 60242256			1 of	2	B-58
	MB	ΓA Right	of Way		LOC	CATION:			Elevation	n: To	otal Depth:
	(Chelsea,	MA			N 2970160 E 77	79561		6.4	4'	22.0'
DRILL	CONTRAC	TOR:	Northern Dri	Il Service	ENG	G: William Checchi			BEGUN	l:	12/31/2013
DRILL	RIG: A	TV Mobi	le B-48, Auto I	Hammer	DRI	LLER: Tim Tucker			FINISH	ED:	12/31/2013
Hole Siz	ze:		Weather:		ı			Ground Wa	ter (Dep	th/Elev.)	:
	3.25" ID				12/	31/13 cloudy 20 F			5'	bgs (12/3	1/13)
Drilling	Method :				Drill	ing Fluid :		Top of Roc	k (Depth):	
	Hol	ow Sten	n Auger			None			No	t Encoun	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION			ASTM Class.		REMARKS
				(incines)		Dry, ballast stone and black GRAVEL and	d SAN	ID, little silt	GM to SM	Air Knife to	6' bgs (12/20/13)
5						Dry, light brown GRAVEL and SAND, little	e silt		GM to SM		
	SPT-1	6	2-1 5-2	10"		Wet, black to gray GRAVEL and SAND, li	ittle silt	, loose	GM to SM		
10						Wet, blue gray CLAY, few fine sand and			011		
	SPT-2	6	4-4 2-1	12"		Moist, blue gray CLAY, few fine sand and medium stiff	i Siit, tra	ace peat,	СН		
					1	Moist, light brown PEAT, little fine sand ar	nd silt,	very soft	PT		
15	SPT-3	4	1-2	8"	-	Moist, light brown PEAT, little fine sand a	nd silt,	soft	PT		
	G . 1 G		2-1								
20											
	TYPES:	trac	e 0 to 5%			SPT Resistance	е				Approve/Date
	SPLIT SPO					1					
	SPLIT SPO			Cohesionles				re Consistency			
	TERB. TUBE			5-9 Lo		10-29 Med. Dense		Soft, 5-8 M/St		tiff	
IKON=K(OCK CORE	mos	stly >50%	30-49	Dense	e 50+ Very Dense	16-3	30 V-Stiff, 3°	ı+ Hard		I



PROJE	CT: Ma	ssDOT S	Silver Line E	xtension					SHE	ET	BORING NO.
SITE L	OCATION:				JOB	NO.: 60242256			2 of	2	B-58
	MB	ΓΑ Right	of Way		LOC	ATION:			Elevatio	n: To	tal Depth:
		Chelsea	, MA		N	2970160	E 77	9561	6.4	.'	22.0'
Depth	Sample	N	Blow Count	Sample		SAMPLE			ASTM		REMARKS
(ft)	Type/No.	Value	(per 6 in.)	Recovery		DESCRIPTION	1		Class.		KLWAKKS
				(inches)							
	007.4		1-5		M	oist, light brown PEAT, very soft			PT		
	SPT-4	11		16"	D	ry, blue gray CLAY, trace silt, stiff			CL		
			6-8								
F					E	nd of Boring @ 22.0' bgs					
25											
F					1						
					1						
30					1						
30 +					1						
F											
					11						
-					1						
35											
_											
F											
-											
40											
, [
					1						
45											
	E TYPES:	trac				SPT Resist	tance)			Approve/Date
	SPLIT SPO						1			0.6	-
	SPLIT SPOO TERB. TUBE		e 15 to 25% ne 30 to 45%			ity: 0-4 Very Loose 10-29 Med. Dense	[3-4 Soft, 5-8 M/S	-		
	OCK CORE				Dense	50+ Very Dense		16-30 V-Stiff, 3			



PROJE	CT: Mas	ssDOT S	Silver Line E	xtension				SHE	ET	BORING NO.
SITE L	OCATION:				JO	OB NO.: 60242256		1 of	f 1	B-59
	MBT	TA Right	of Way		LC	OCATION:		Elevation	on: To	otal Depth:
	(Chelsea,	, MA	ļ		N 2970208 E 779567		6.0	0'	12.0
DRILL	CONTRAC	TOR:	Northern Dri	Il Service	ΕN	IG: William Checchi		BEGUN	1:	12/30/2013
DRILL	RIG: µ	ATV Mobi	ile B48, Auto H	łammer	DF	RILLER: Tim Tucker		FINISH	ED :	12/30/2013
Hole Siz	ze:		Weather:				Ground Wa	ter (Dep	oth/Elev.)	:
	3.25" ID			12	2/30	0/13 partly cloudy 35 F		5'	bgs (12/1	8/13)
Drilling	Method :		.	-	Dri	illing Fluid :	Top of Roc	k (Depth	ı) :	
	Holl	low Sten	n Auger			None		No	t Encoun	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
						Dry, ballast stone and black GRAVEL and SANI	D, little silt	GM to SM	Hand Auge	r to 6' bgs (12/19/13)
								SIVI		
								SM		
_						Moist, light brown SAND, little gravel and silt		O.W.		
5						FILL				
			5-6			Wet, brown GRAVEL and SAND, little silt, medi	um dense	GM to SM		
	SPT-1	19	13-15	4"				SIVI		
			10 10							
										4.4.4070/
10									organics 22	ntent 167%, .9%
						Wet, dark brown PEAT and organic SILT, some soft	sand, very	PT to OH	sand 30.3%	i, fines 69.7%
	SPT-2	0	woh/24"	16"		SUIT		ОП		85, Liquid limit 172,
									Plastic inde	x 87
						End of Boring @ 12.0' bgs				
15										
13										
_										
_										
				_						
	TYPES:	trac				SPT Resistance				Approve/Date
	SPLIT SPO			0.1	_	0.4.4		0.01/	0.5	
	SPLIT SPOC LBY TUBE		ne 30 to 45%	Cohesionles 5-9 Lo			ve Consistency Soft, 5-8 M/St	•		
	OCK CORE		stly >50%	30-49 [30 V-Stiff, 3			

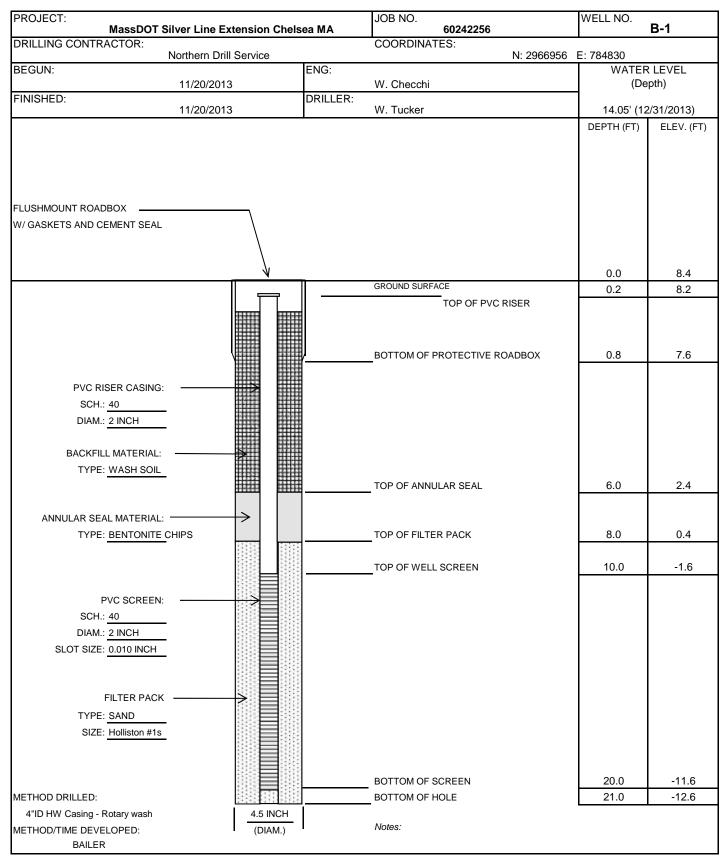


PROJE	CI: Mas	ssDOT S	Silver Line E	xtension)			SHE	EI	BORING NO.
SITE L	OCATION:				JOI	3 NO.: 60242256		1 of	1	B-60
	MB	ΓΑ Right	of Way		LO	CATION:		Elevation	n: To	otal Depth:
	(Chelsea	MA			N 2970193 E 7794	50	6.4	4'	17.0'
DRILL	CONTRAC	TOR :	Northern Dri	Il Service	EN	G: William Checchi		BEGUN	l:	12/31/2013
DRILL	RIG:	ATV Mobi	le B48, Auto H	lammer	DR	ILLER: Tim Tucker		FINISH	ED:	12/31/2013
Hole Siz	ze:		Weather:				Ground Wa	ater (Dep	th/Elev.)	:
	3.25" ID				12	/31/13 cloudy 20 F		6.0	bgs (12/	31/13)
Drilling	Method :				Dril	ling Fluid :	Top of Roc	k (Depth):	
	Hol	low Sten	n Auger			None		No	t Encoun	tered
Depth (ft)	Sample Type/No.	N Value	Blow Count (per 6 in.)	Sample Recovery (inches)		SAMPLE DESCRIPTION		ASTM Class.		REMARKS
				, ,		Dry, black GRAVEL and SAND, little silt		GM to SM	Air Knife to	6' bgs (12/19/13)
						FILL			Hazmat sai	mple
									Hazmat sa	mple
	Bulk Sample					Dry, tan to brown SAND, some gravel and lit	tle silt			
						, ,		SM	Hazmat sai	тріе
5									auger grind	ling thru gravels
			7.0			Wet, brown SAND, some gravel, little silt, me	edium dense	SM		
	SPT-1	9	7-6	6"						
			3-2							
10										
	SPT-2	0	woh/24"	22"		Wet, gray CLAY, trace silt and peat, very sol	t	ОН		
15										
	SPT-3	1	woh/14"	24"		Moist, dark brown CLAY, few peat and silt, v	ery soft	ОН		
	361-2	'	1-2	24						
						End of Daving @ 47 Olber				
					_	End of Boring @ 17.0' bgs				
20										
	TYPES:	trac				SPT Resistance				Approve/Date
	SPLIT SPO			Cohosissi	aa D	noitru 0.4 Venul ege-	socius Coi-t-	. 0.01/2	Coff	-
	SPLIT SPOO LBY TUBE	ON little son		Cohesionles 5-9 Lo			nesive Consistency 3-4 Soft, 5-8 M/S	-		
	OCK CORE			30-49			16-30 V-Stiff, 3			

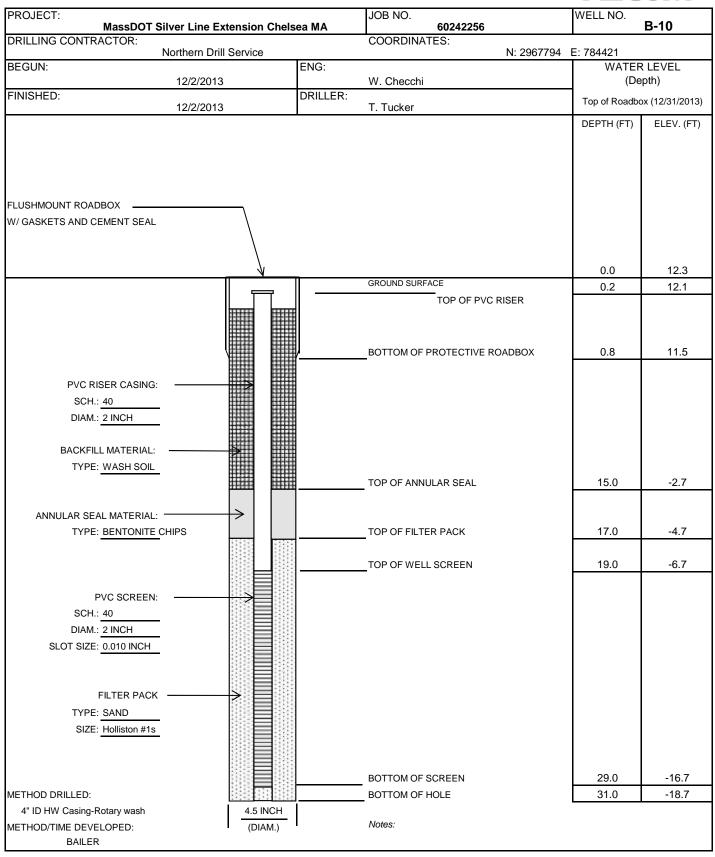
ATTACHMENT 2



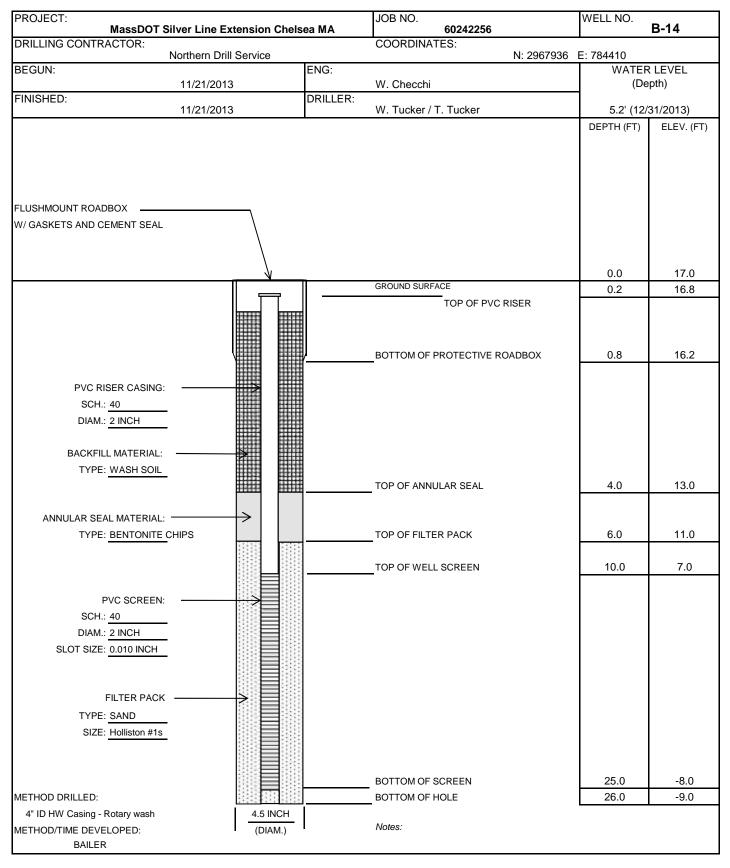








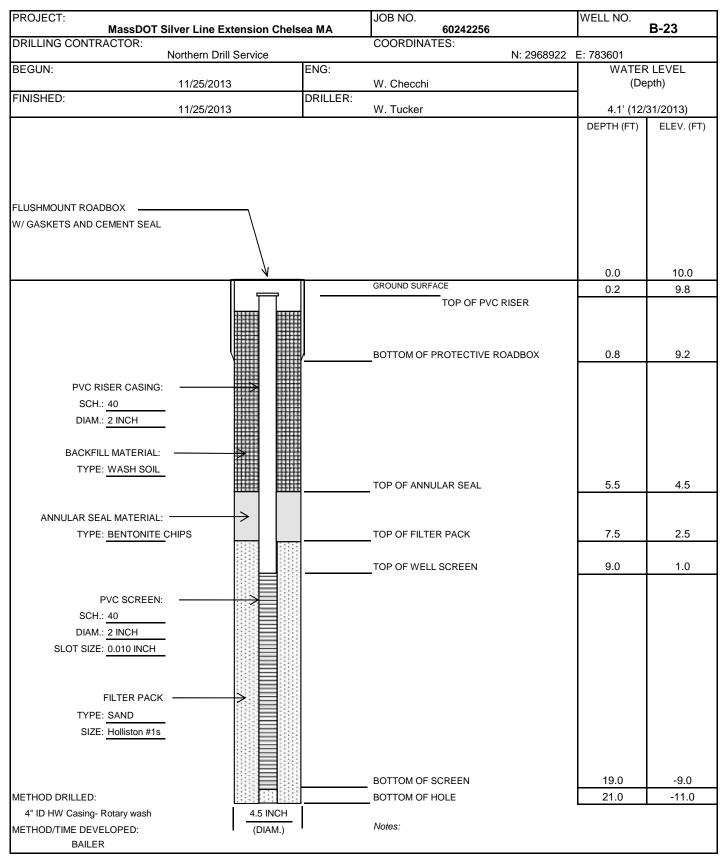




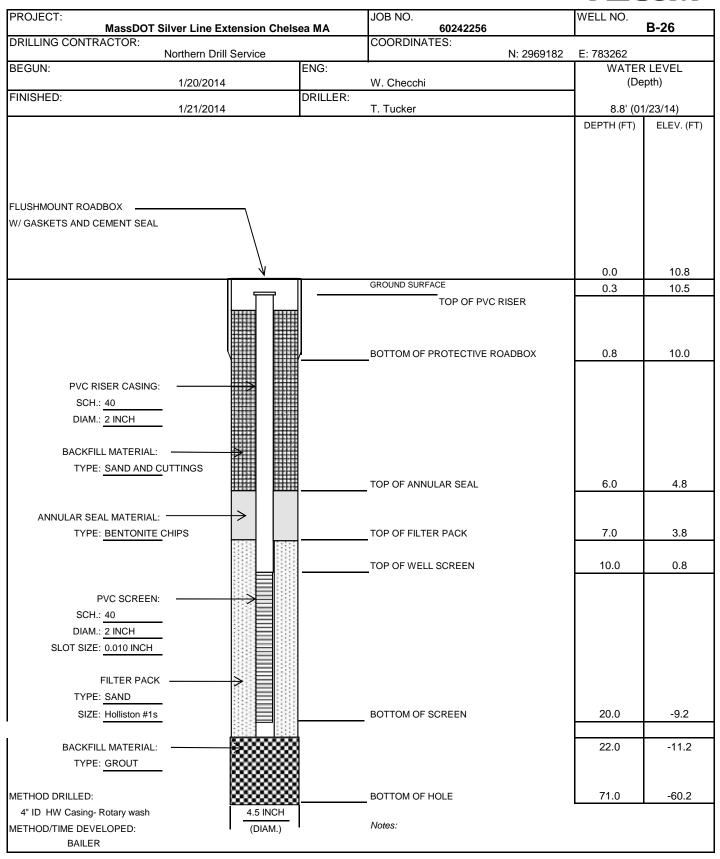


DRILLING CONTRACTOR:	11/26/2013	ea MA ENG: DRILLER:	JOB NO. 60242256 COORDINATES: N: 2968420 W. Checchi T. Tucker	E: 784132 WATER	B-20 R LEVEL epth)
BEGUN: FINISHED: FLUSHMOUNT ROADBOX	11/26/2013		N: 2968420 W. Checchi	E: 784132 WATER (De	R LEVEL epth)
BEGUN: FINISHED: FLUSHMOUNT ROADBOX	11/26/2013		W. Checchi	WATER (De 5.6' (12/	epth)
FINISHED: FLUSHMOUNT ROADBOX	11/26/2013			(De	epth)
FLUSHMOUNT ROADBOX		DRILLER:		5.6' (12/	
FLUSHMOUNT ROADBOX			T. Tucker		31/2013)
				DEPTH (FT)	1
				(' ')	ELEV. (FT)
		1	GROUND SURFACE	0.0	9.9
		l ——	TOP OF PVC RISER	0.2	9.7
			TOP OF PVC RISER		
)	BOTTOM OF PROTECTIVE ROADBOX	0.8	9.1
PVC RISER CASING:					
SCH.: 40				ļ	
DIAM.: 2 INCH					
DACKELL MATERIAL.				ļ	
BACKFILL MATERIAL:					
TYPE: WASH SOIL			TOP OF ANNULAR SEAL	5.0	4.9
	*****		TOP OF ANNOLAR SEAL	3.0	4.5
ANNULAR SEAL MATERIAL:	──				
TYPE: BENTONITE			TOP OF FILTER PACK	7.0	2.9
THE. DENTONIE				7.0	2.0
			TOP OF WELL SCREEN	10.0	-0.1
			_		
PVC SCREEN:				1	
SCH.: 40				1	
DIAM.: 2 INCH				1	
SLOT SIZE: 0.010 INCH					
EII TED SAOV					
FILTER PACK				1	
TYPE: SAND				1	
SIZE: Holliston #1s					
				1	
			BOTTOM OF SCREEN	20.0	-10.1
METHOD DRILLED:			BOTTOM OF SCREEN BOTTOM OF HOLE	21.0	-10.1
4" HW Casing-Rotary wash	4.5 INCH		_ BOTTOW OF HOLE	21.0	-11.1
METHOD/TIME DEVELOPED:	(DIAM.)		Notes:		
BAILER	- (DIAIVI.)				









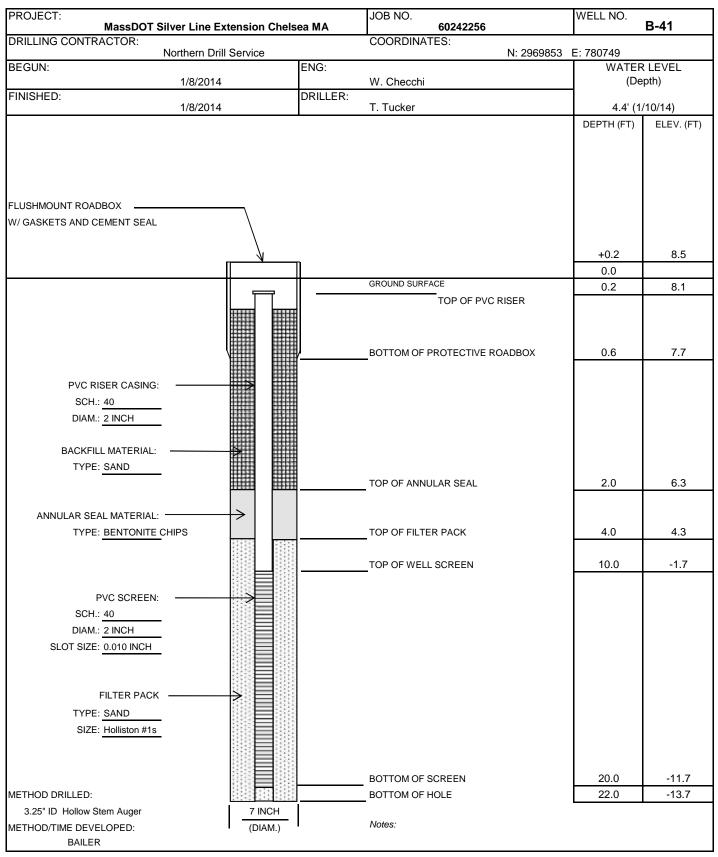


					/11/	
PROJECT:	MassDOT Silver Line	Extension Chels	sea MA	JOB NO. 60242256	WELL NO.	B-30A
DRILLING CON	TRACTOR:			COORDINATES:	F 700-0-	
DECLIN.	Northern D		ENG:	N: 2969359	E: 782585	R LEVEL
BEGUN:	1/27/201		ENG:	W. Checchi		epth)
FINISHED:	1/21/20		DRILLER:		7	· [/
	1/28/201	4		T. Tucker		1/30/14)
					DEPTH (FT)	ELEV. (FT)
FLUSHMOUNT RO W/ GASKETS AND						
		\bigvee			0.0	9.8
		<u> </u>		GROUND SURFACE	0.4	9.4
				TOP OF PVC RISER		
			<u> </u>	BOTTOM OF PROTECTIVE ROADBOX	0.8	9.0
P\/C	C RISER CASING: ———					
	CH.: 40					
	AM.: 2 INCH					
Di/	WILL Z HVOTT					
BACK	KFILL MATERIAL: ————					
	PE: SAND AND CUTTINGS					
	· -· <u>-· · · · · · · · · · · · · · · · ·</u>			TOP OF ANNULAR SEAL	3.0	6.8
	SEAL MATERIAL:	 >				
TY	PE: BENTONITE CHIPS	119191 TS125	(TOP OF FILTER PACK	4.0	5.8
				TOP OF WELL SCREEN	10.0	-0.2
			-	TOT OF WELL SOILEIN	10.0	0.2
	PVC SCREEN: ———					
SC	CH.: 40					
	AM.: 2 INCH					
	IZE: 0.010 INCH					
	EII TED DAGU					
	FILTER PACK ————	->				
	PE: SAND			DOTTOM OF SCREEN	20.0	40.0
SI	IZE: Holliston #1s			_ BOTTOM OF SCREEN	20.0	-10.2
BACK	KFILL MATERIAL: ————	2000000			21.0	-11.2
	PE: GROUT					
METHOD DRILLEI	D:			BOTTOM OF HOLE	71.0	-61.2
4" ID HW Casir	ng- Rotary wash	4.5 INCH]			
METHOD/TIME DE		(DIAM.)	I	Notes:		
BAIL	-EIV					



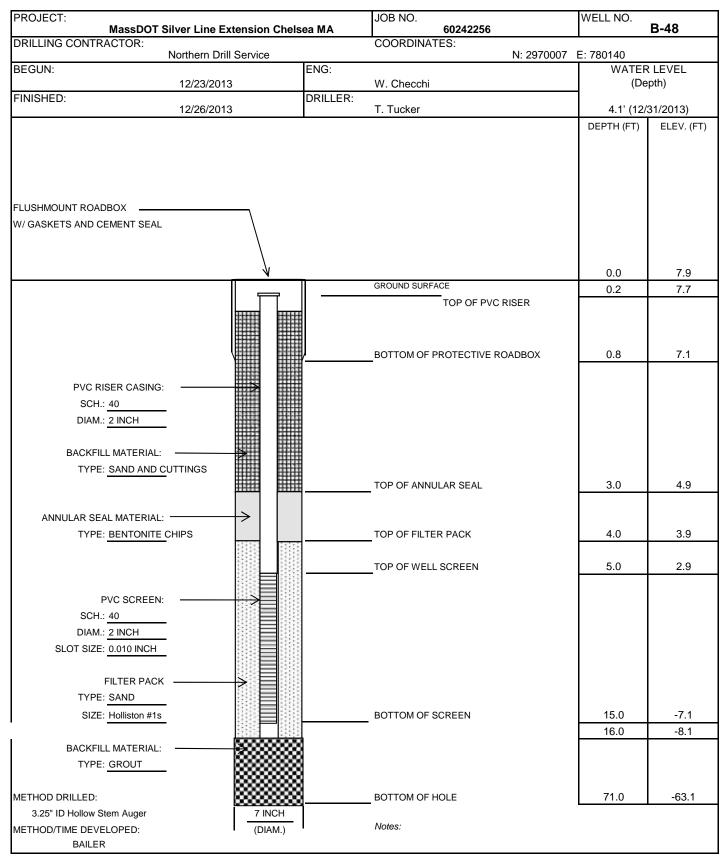
PROJECT:				JOB NO.	WELL NO.	B-35
DRILLING CONT	MassDOT Silver Line E	xtension Chels	ea MA	60242256 COORDINATES:		B-35
	Northern Dri		•	N: 2969523		
BEGUN:	2/3/2014		ENG:	W. Checchi		R LEVEL pth)
FINISHED:	2/3/2014		DRILLER:	W. Checchi		:piii)
	2/3/2014		DIVILLETY.	T. Tucker	6.6' (2	/10/14)
					DEPTH (FT)	ELEV. (FT)
FLUSHMOUNT RO	DADBOX					
W/ GASKETS AND	CEMENT SEAL					
		V			0.0	8.7
				GROUND SURFACE	0.3	8.4
				TOP OF PVC RISER		
			J	BOTTOM OF PROTECTIVE ROADBOX	0.7	8.0
PVC	RISER CASING:					
SC	:H.: <u>40</u>					
DIA	M.: 2 INCH					
	FILL MATERIAL:					
TYF	PE: <u>SAND AND C</u> UTTINGS			TOP OF ANNULAR SEAL	3.0	5.7
ANNI II AD S	SEAL MATERIAL:	\rightarrow				
	PE: BENTONITE CHIPS			TOP OF FILTER PACK	4.0	4.7
	E. <u>BENTONTE O</u> TIII O			_		
				TOP OF WELL SCREEN	10.0	-1.3
1	PVC SCREEN: ———	- 				
SC	CH.: 40					
DIAI	M.: 2 INCH					
SLOT SIZ	ZE: 0.010 INCH					
	FILTER PACK ————	→ III				
TYF	PE: SAND					
	ZE: Holliston #1s					
				BOTTOM OF SCREEN	20.0	-11.3
BACKI	FILL MATERIAL:	\rightarrow				
TYF	PE: SAND					
METHOD DRILLED) :			BOTTOM OF HOLE	22.0	-13.3
3.25" ID Hollow	v Stem Auger	7- INCH		_		
METHOD/TIME DE		(DIAM.)		Notes:		
	ER					









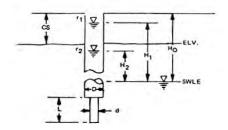


ATTACHMENT 3

FALLING HEAD TEST DATA & ANALYSES

AECOM

STAGE 2 CALCULATIONS



d =	5.08	cm
D =	10.16	cm
CS =	45.72	cm
L =	60.96	cm
H ₀ =	ND	cm

Project: MassDOT

Silver Line Extension

Chelsea, MA

Project No.: 60242256.1901.01

Test No.: B-10

Test Depth*: 4.0 - 6.0 ft.

(*see Note 1)

Calculations:

 $K_h = [D^{2*}Ln[mL/d + SQRT(1 + (mL/d)^2)]/(8L)]^*LN(H_1/H_2)/(t_2 - t_1)$

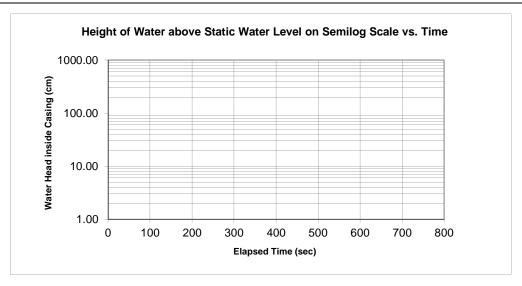
 $m = (Kh/Kv)^{0.5} =$

 $K_h = 0.0000 \frac{\text{*LN}(H_1/H_2)/(t_2-t_1)}{\text{*LN}(H_1/H_2)/(t_2-t_1)}$

Date	Elapsed Time (min.)	Elapsed Time (sec.)	DROP (ft)	DROP (cm)	H (cm)	LN(H1/H2)/∆t	Kh (cm/s)
							SETUP
12/2/2014	0.0	0	0.00	0.00			
	1.0	60	0.00	0.00			
	5.0	300	0.00	0.00			
	10.0	600	0.00	0.00			
	15.0	900	0.00	0.00			
	Materia	als are imperme	eable - no me	asurable drop i	in head was o	bserved	
		1					

Notes:

- 1. Falling head test was performed above the static water table.
- 2. Artesian conditions were later observed in the B-10 well; the B-10 well is screened from 19 to 29 ft.
- 3. Soils in test zone are described as: Olive clay, some sand, little gravel, few silt (Glacial Till).

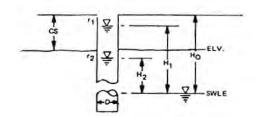


	Kh =	Impermeable	cm/s
Check m value:	m =		

Comments:	Test well installed b	y Northern Drill Service (T. Tu	cker). Data recorded by AECC	M (W. Checchi)
	Prepared by:	K. Harten	Reviewed by:	Jose A. Ramon



STAGE 1 CALCULATIONS



Project: MassDOT

Silver Line Extension

Chelsea, MA

Project No.: 60242256.1901.01

Test No.: **B-14**Test Depth: **9.0 ft.**

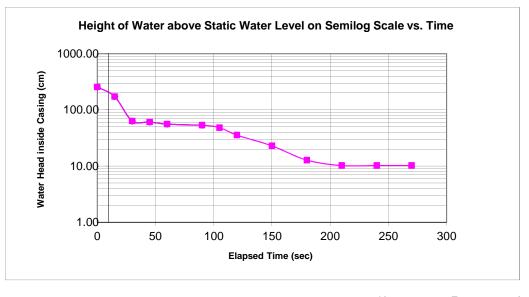
Calculations:

$$K_m = [3.14*D/11]*LN(H_1/H_2)/(t_2-t_1)$$
 $K_m = 2.90 *LN(H_1/H_2)/(t_2-t_1)$

Date	Elapsed Time (min.)	Elapsed Time (sec.)	DROP (ft)	DROP (cm)	H (cm)	LN(H1/H2)/∆t	Km (cm/s)
							SETUP
11/21/2014	0.00	0	0.00	0.00	256.64	-	-
	0.25	15	2.75	83.82	172.82	2.6E-02	7.6E-02
	0.50	30	6.33	192.94	63.70	6.7E-02	1.9E-01
	0.75	45	6.42	195.58	61.06	2.8E-03	8.2E-03
	1.00	60	6.58	200.66	55.98	5.8E-03	1.7E-02
	1.50	90	6.67	203.18	53.46	1.5E-03	4.5E-03
	1.75	105	6.83	208.28	48.36	6.7E-03	1.9E-02
	2.00	120	7.25	220.98	35.66	2.0E-02	5.9E-02
_	2.50	150	7.67	233.66	22.98	1.5E-02	4.2E-02
	3.00	180	8.00	243.84	12.80	2.0E-02	5.7E-02
_	3.50	210	8.08	246.38	10.26	7.4E-03	2.1E-02
	4.00	240	8.08	246.38	10.26	Invalid	Invalid
	4.50	270	8.08	246.38	10.26	Invalid	Invalid

Notes:

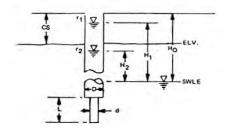
^{1.} No Sample Recovery was recorded for the 9 to 11 SPT sample.



 $Km = \underline{5.0E-02}$ cm/s

Comments: Test well installed b	y Northern Drill Service (T. Tu	cker). Data recorded by AECO	M (W. Checchi)
Prepared by:	K. Harten	Reviewed by:	Jose a Ramon

STAGE 2 CALCULATIONS



d =	5.08	cm
D =	10.16	cm
CS =	45.72	cm
L =	60.96	cm
H₀ =	256.03	cm

Project: MassDOT

Silver Line Extension

Chelsea, MA

Project No.: 60242256.1901.01 Test No.: **B-14**

Test Depth: 9.0 - 11.0 ft.

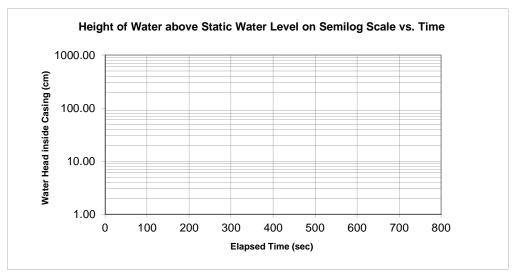
Calculations:

 $K_h = [D^{2*}Ln[mL/d+SQRT(1+(mL/d)^2)]/(8L)]*LN(H_1/H_2)/(t_2-t_1)$

 $m = (Kh/Kv)^{0.5} =$

*LN(H₁/H₂)/(t₂-t₁)

Elapsed Time (min.)	Elapsed Time (sec.)	DROP (ft)	DROP (cm)	H (cm)	LN(H1/H2)/∆t	Kh (cm/s)
						SETUP
- 	Materials	too permeab	le - unable to t	ill casing	-	
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			-	
		(min.) (sec.)	(min.) (sec.) DROP (II)	(min.) (sec.) DROP (II) DROP (EIII)		(min.) (sec.)

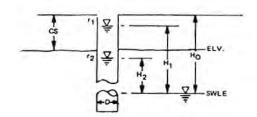


	Kh =	Too Permeable	cm/s
Check m value:	m =		

Comments: Test well inst	talled by Northern Drill Service (T.	. Tucker). Data recorded by AECC	M (W. Checchi)
Prepar	red by: K. Harten	Reviewed by:	Jose A. Ramon



STAGE 1 CALCULATIONS



$$\begin{array}{ccc} D = & 10.16 & cm \\ CS = & 45.72 & cm \\ H_0 = & \underline{See\ \textit{Note}\ 2} & cm \end{array}$$

Project: MassDOT

Silver Line Extension

Chelsea, MA

Project No.: 60242256.1901.01

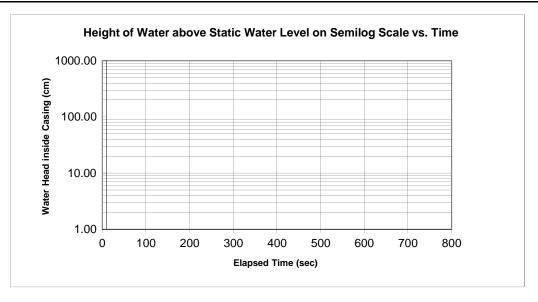
Test No.: **B-17**

Test Depth: 9.0 ft.

$$\begin{split} K_{m} &= [3.14*D/11]*LN(H_{1}/H_{2})/(t_{2}-t_{1}) \\ K_{m} &= 2.90 & *LN(H_{1}/H_{2})/(t_{2}-t_{1}) \end{split}$$

Date	Elapsed Time (min.)	Elapsed Time (sec.)	DROP (ft)	DROP (cm)	H (cm)	LN(H1/H2)/∆t	Km (cm/s)
							SETUP
	0.0	0	0.00	0.00			
	2.0	120	0.00	0.00			
	5.0	300	0.00	0.00			
	10.0	600	0.00	0.00			
	15.0	900	0.00	0.00			
	Materia	als are imperme	eable - no mea	asurable drop	in head was ol	bserved	

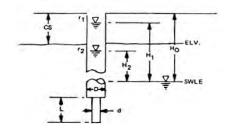
- 1. Soils in test zone are described as: Gray fines with little sand & gravel (Glacial Till).
- 2. The static water level could not be determined at the time of drilling.



Km = <u>Impermeable</u> cm/s

Comments: Test well installed b	y Northern Drill Service (T. Tu	cker). Data recorded by AECC	DM (W. Checchi)
Prepared by:	K. Harten	Reviewed by:	Jose a Ramon

STAGE 2 CALCULATIONS



d =	5.08	cm
D = _	10.16	cm
CS =	45.72	cm
L = -	60.96	cm
H₀ =	See Note 2	cm

Project: MassDOT

Silver Line Extension

Chelsea, MA

Project No.: 60242256.1901.01 Test No.: **B-17**

Test Depth: 9.0 - 11.0 ft.

Calculations:

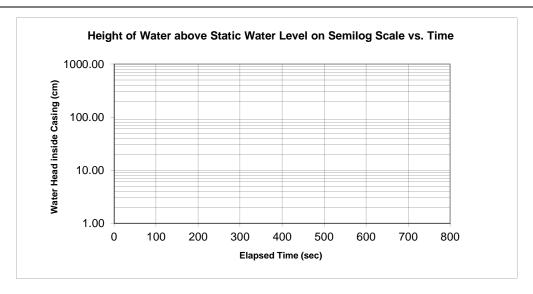
$$K_h = [D^{2\star} Ln[mL/d + SQRT(1 + (mL/d)^2)]/(8L)]^{\star} LN(H_1/H_2)/(t_2 - t_1)$$

 $m = (Kh/Kv)^{0.5} =$

*LN(H₁/H₂)/(t₂-t₁)

Date	Elapsed Time (min.)	Elapsed Time (sec.)	DROP (ft)	DROP (cm)	H (cm)	LN(H1/H2)/∆t	Kh (cm/s)
							SETUP
	0.0	0	0.00	0.00			
	2.0	120	0.00	0.00			
	5.0	300	0.00	0.00			
	10.0	600	0.00	0.00			
	15.0	900	0.00	0.00			
		<u> </u>					
	Materia	als are imperme	eable - no me	asurable drop i	in head was o	bserved	
	Materio	als are imperme	eable - no me	asurable drop i	in head was d	bserved	
	Materia	als are imperme	eable - no me	asurable drop i	in head was o	bserved	

- 1. Soils in test zone are described as: Gray fines with little sand & gravel (Glacial Till).
- 2. The static water level could not be determined at the time of drilling.

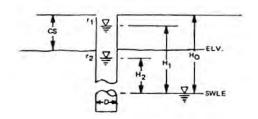


	Kh =	Impermeable	_cm/s
Check m value:	m =		_

Comments: Test well inst	talled by Northern Drill Service (T.	. Tucker). Data recorded by AECC	M (W. Checchi)
Prepar	red by: K. Harten	Reviewed by:	Jose A. Ramon



STAGE 1 CALCULATIONS



Project: MassDOT

Silver Line Extension

Chelsea, MA

Project No.: 60242256.1901.01

Test No.: B-17A

Test Depth: 4.0 ft.

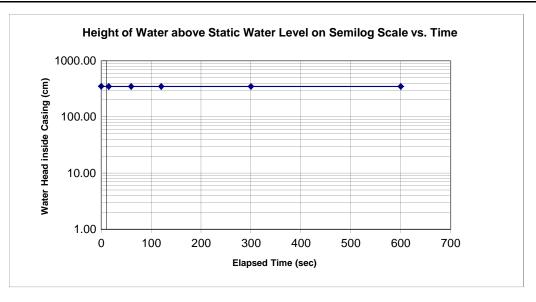
Calculations:

$$\begin{split} K_m &= [3.14*D/11]*LN(H_1/H_2)/(t_2-t_1) \\ K_m &= 2.90 &*LN(H_1/H_2)/(t_2-t_1) \end{split}$$

Date	Elapsed Time (min.)	Elapsed Time (sec.)	DROP (ft)	DROP (cm)	H (cm)	LN(H1/H2)/∆t	Km (cm/s)
							SETUP
	0.00	0	0.000	0.00	350.52	-	-
	0.25	15	0.021	0.64	349.89	1.2E-04	3.5E-04
	1.00	60	0.031	0.95	349.57	2.0E-05	5.9E-05
	2.00	120	0.031	0.95	349.57	Invalid	Invalid
	5.00	300	0.031	0.95	349.57	Invalid	Invalid
	10.00	600	0.031	0.95	349.57	Invalid	Invalid
	15.00	900	0.031	0.95	349.57	Invalid	Invalid
	- Materials	are highly impe	rmeable - a d	liscontinous dro	op in head w	as observed	

Notes.

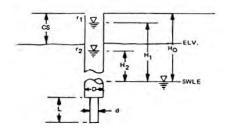
- 1. Soils in test zone are described as: Black silty gravel and sand (GM/SM).
- 2. The static water level could not be determined at the time of drilling. An assumed static water level depth of 10 feet was used to roughly estimate permeability.



Km = <u>Undetermined</u> cm/s

Comments:	Test well installed b	y Northern Drill Service (T. Tu	cker). Data recorded by AECC	DM (W. Checchi)
	Prepared by:	K. Harten	Reviewed by:	Jose a Ramon

STAGE 2 CALCULATIONS



d =	5.08	cm
D =	10.16	cm
CS =	45.72	cm
L =	60.96	cm
Ho*=	350.52	cm
	(*see Note 2)	

Project: MassDOT

Silver Line Extension

Chelsea, MA

Project No.: 60242256.1901.01

Test No.: B-17A

Test Depth: 4.0 - 6.0 ft.

Calculations:

$$K_h = [D^{2*}Ln[mL/d+SQRT(1+(mL/d)^2)]/(8L)]*LN(H_1/H_2)/(t_2-t_1)$$

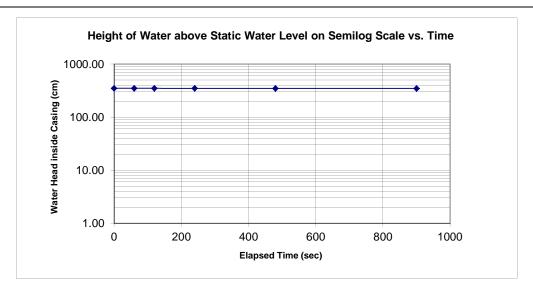
$$m = (Kh/Kv)^{0.5} = 1.000$$
 (assumed)

 $K_h = 0.6731$ *LN(H₁/H₂)/(t₂-t₁)

Date	Elapsed Time (min.)	Elapsed Time (sec.)	DROP (ft)	DROP (cm)	H (cm)	LN(H1/H2)/∆t	Kh (cm/s)
							SETUP
	0.0	0	0.00	0.00	350.52	-	-
	1.0	60	0.02	0.48	350.04	2.3E-05	1.5E-05
	2.0	120	0.03	0.95	349.57	2.3E-05	1.5E-05
	4.0	240	0.04	1.11	349.41	3.8E-06	2.5E-06
	8.0	480	0.06	1.75	348.77	7.6E-06	5.1E-06
	15.0	900	0.07	2.22	348.30	3.3E-06	2.2E-06

1. Soils in test zone are described as: Black silty gravel and sand (GM/SM).

2. The static water level could not be determined at the time of drilling. An assumed static water level depth of 10 feet was used in the permeability calculations. The falling head test is assumed to have been performed above the depth of the water table.



Check m value:

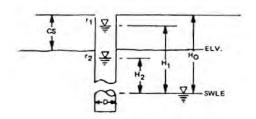
8.1E-06 cm/s 1.000

(assumed)

Comments: Test well installed by Northern Drill Service (T. Tucker). Data recorded by AECOM (W. Checchi) Jose A Ramos Prepared by K. Harten Reviewed by



STAGE 1 CALCULATIONS



Project: MassDOT

Silver Line Extension

Chelsea, MA

Project No.: 60242256.1901.01 Test No.: **B-26 Test #1**

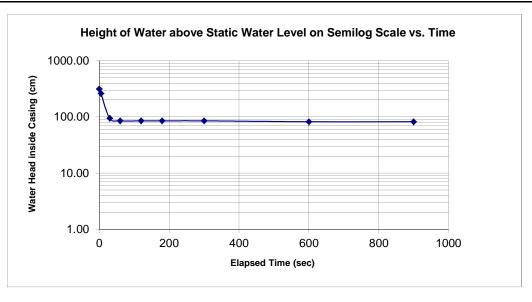
Test Depth: 6.0 ft. (see Note 1)

$$\begin{split} K_m &= [3.14*D/11]*LN(H_1/H_2)/(t_2-t_1) \\ K_m &= \underbrace{ 2.90} *LN(H_1/H_2)/(t_2-t_1) \end{split}$$

Date	Elapsed Time (min.)	Elapsed Time (sec.)	DROP (ft)	DROP (cm)	H (cm)	LN(H1/H2)/∆t	Km (cm/s)
							SETUP
1/20/2014	0.00	0	0.00	0.00	313.94	-	-
	0.08	5	1.70	51.82	262.13	3.6E-02	1.0E-01
	0.50	30	7.20	219.46	94.49	4.1E-02	1.2E-01
	1.00	60	7.50	228.60	85.34	3.4E-03	9.8E-03
	2.00	120	7.50	228.60	85.34	Invalid	Invalid
	3.00	180	7.50	228.60	85.34	Invalid	Invalid
	5.00	300	7.50	228.60	85.34	Invalid	Invalid
	10.00	600	7.60	231.65	82.30	Invalid	Invalid
	15.00	900	7.60	231.65	82.30	Invalid	Invalid
	Recorded drops ≥7.5 feet (i.e., the casing length) are erroneous and result in invalid data						

Notes.

- 1. Falling head test was performed above depth of water table
- 2. Soils in test zone are described as: Tan Sand, some gravel, little silt (SM)

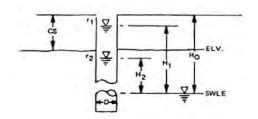


 $Km = ____ 1.1E-01 ___ cm/s$

Comments: Test well installed b	y Northern Drill Service (T. Tu	cker). Data recorded by AECC	DM (W. Checchi)
Prepared by:	K. Harten	Reviewed by:	Jose A Raman



STAGE 1 CALCULATIONS



Project: MassDOT

Silver Line Extension

Chelsea, MA

Project No.: 60242256.1901.01 Test No.: **B-26 Test #2**

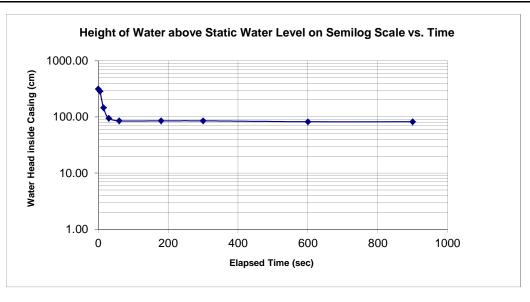
Test Depth: 6.0 ft. (see Note 1)

$$\begin{split} K_m &= [3.14*D/11]*LN(H_1/H_2)/(t_2-t_1) \\ K_m &= 2.90 &*LN(H_1/H_2)/(t_2-t_1) \end{split}$$

Date	Elapsed Time (min.)	Elapsed Time (sec.)	DROP (ft)	DROP (cm)	H (cm)	LN(H1/H2)/∆t	Km (cm/s)
							SETUP
1/20/2014	0.00	0	0.00	0.00	313.94	-	-
	0.08	5	0.90	27.43	286.51	1.8E-02	5.3E-02
	0.25	15	5.50	167.64	146.30	6.7E-02	1.9E-01
	0.50	30	7.20	219.46	94.49	2.9E-02	8.5E-02
	1.00	60	7.50	228.60	85.34	3.4E-03	9.8E-03
	3.00	180	7.50	228.60	85.34	Invalid	Invalid
	5.00	300	7.50	228.60	85.34	Invalid	Invalid
	10.00	600	7.60	231.65	82.30	Invalid	Invalid
	15.00	900	7.60	231.65	82.30	Invalid	Invalid
	Recorded drops ≥7.5 feet (i.e., the casing length) are erroneous and result in invalid data						

Notes:

- 1. Falling head test was performed above depth of water table
- 2. Soils in test zone are described as: Tan Sand, some gravel, little silt (SM)

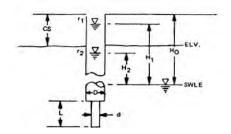


Km = ____1.1E-01 __cm/s

Comments: Test well installed b	y Northern Drill Service (T. Tu	cker). Data recorded by AECC	DM (W. Checchi)
Prepared by:	K. Harten	Reviewed by:	Jose A Raman



STAGE 2 CALCULATIONS



Calculations:

d = _	5.08	cm
D =	10.16	cm
CS =	45.72	cm
L = _	60.96	cm (see Note 2)
H0 =	313.94	cm

 Project:
 MassDOT

 Silver Line Extension

 Chelsea, MA

 Project No.:
 60242256.1901.01

Test No.: B-26
Test Depth*: 6.0 - 8.0 ft.
(*see Note 1)

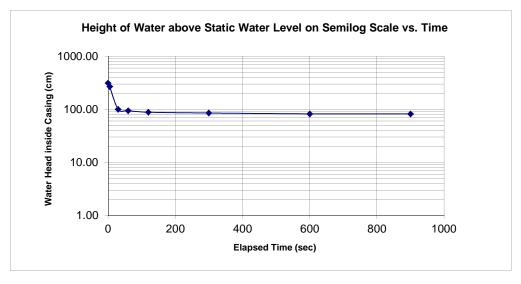
 $K_h = [D^{2*}Ln[mL/d+SQRT(1+(mL/d)^2)]/(8L)]^*LN(H_1/H_2)/(t_2-t_1)$

 $m = (Kh/Kv)^{0.5} = 0.02$ $K_h = 0.0379 *LN(H_1/H_2)/(t_2-t_1)$

Date	Elapsed Time (min.)	Elapsed Time (sec.)	DROP (ft)	DROP (cm)	H (cm)	LN(H1/H2)/∆t	Kh (cm/s)
							SETUP
1/20/2014	0.00	0	0.00	0.00	313.94	-	-
	0.08	5	1.50	45.72	268.22	3.1E-02	1.2E-03
	0.50	30	7.00	213.36	100.58	3.9E-02	1.5E-03
	1.00	60	7.20	219.46	94.49	2.1E-03	7.9E-05
	2.00	120	7.40	225.55	88.39	1.1E-03	4.2E-05
	5.00	300	7.50	228.60	85.34	1.9E-04	7.4E-06
	10.00	600	7.60	231.65	82.30	Invalid	Invalid
	15.00	900	7.60	231.65	82.30	Invalid	Invalid
	Test conditions casing length)	s are no longer	valid once re	corded drops e	xceed 7.5 fee	et (i.e., the	

Notes

- 1. Falling head test was performed above depth of water table.
- 2. Soils in test zone are described as: Tan Sand, some gravel, little silt (SM).
- 3. SPT sample hole collapsed upon spoon retrieval.



Comments: Test well installed by Northern Drill Service (T. Tucker). Data recorded by AECOM (W. Checchi)

Prepared by:

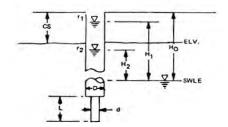
K. Harten

Reviewed by:

Jacob Ramon



STAGE 2 CALCULATIONS



 $\begin{array}{c} d = & 5.08 & \text{cm} \\ D = & 10.16 & \text{cm} \\ CS = & 45.72 & \text{cm} \\ L = & 60.96 & \text{cm (see Note 2)} \\ H_0 = & 335.28 & \text{cm} \end{array}$

Project: MassDOT

Silver Line Extension

Chelsea, MA
Project No.: 60242256.1901.01

Test No.: **B-27 Test #1**

Test Depth*: 6.0 - 8.0 ft.

(*see Note 1)

Calculations:

 $K_h = [D^{2*}Ln[mL/d + SQRT(1 + (mL/d)^2)]/(8L)]^*LN(H_1/H_2)/(t_2 - t_1)$

 $m = (Kh/Kv)^{0.5} =$

1.0 (assumed)

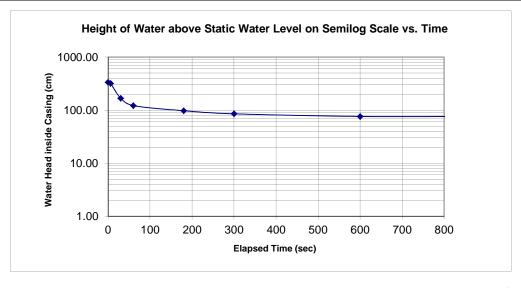
 $K_h = 0.6731$

*LN(H_1/H_2)/(t_2 - t_1)

Date	Elapsed Time (min.)	Elapsed Time (sec.)	DROP (ft)	DROP (cm)	H (cm)	LN(H1/H2)/∆t	Kh (cm/s)
							SETUP
1/23/2014	0.00	0	0.00	0.00	335.28	-	-
	0.10	6	0.50	15.24	320.04	7.8E-03	5.2E-03
	0.50	30	5.50	167.64	167.64	2.7E-02	1.8E-02
	1.00	60	7.00	213.36	121.92	1.1E-02	7.1E-03
	3.00	180	7.80	237.74	97.54	Invalid	Invalid
	5.00	300	8.20	249.94	85.34	Invalid	Invalid
	10.00	600	8.50	259.08	76.20	Invalid	Invalid
	15.00	900	8.50	259.08	76.20	Invalid	Invalid
	Test conditions casing length)	s are no longer	valid once re	corded drops e	exceed 7.5 fee	et (i.e., the	

Notes

- 1. Falling head test was performed above depth of water table.
- 2. Soils in test zone are described as: Tan Sand, some gravel, few silt.
- 3. The SPT sample hole collapsed to a depth of 8.8 ft. below the top of casing.



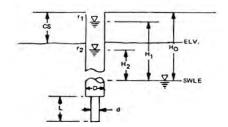
Check m value:

 $\begin{array}{cccc} \text{Kh} = & 1.0\text{E-}02 & \text{cm/s} \\ \text{m} = & 1.0 & \textit{(assumed)} \end{array}$

Comments: Test well installed b	y Northern Drill Service (T. Tu	cker). Data recorded by AECC	M (W. Checchi)
Prepared by:	K. Harten	Reviewed by:	Jose A Camon



STAGE 2 CALCULATIONS



d = _	5.08	cm
D =	10.16	cm
CS =	45.72	cm
L =	60.96	cm (see Note 2)
H0 =	335.28	cm

Project: MassDOT

Silver Line Extension Chelsea, MA

Project No.: 60242256.1901.01

Test No.: **B-27 Test #2**

Test Depth*: 6.0 - 8.0 ft.

(*see Note 1)

Calculations:

 $K_h = [D^{2*}Ln[mL/d+SQRT(1+(mL/d)^2)]/(8L)]^*LN(H_1/H_2)/(t_2-t_1)$

 $m = (Kh/Kv)^{0.5} =$

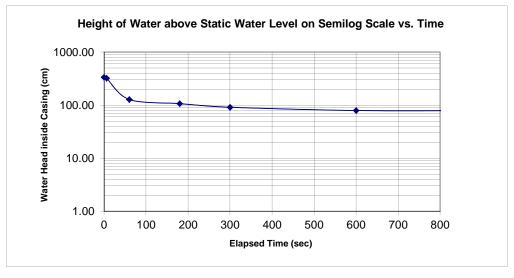
1.0 (assumed)

 $K_h = 0.6731$

 $*LN(H_1/H_2)/(t_2-t_1)$

Date	Elapsed Time (min.)	Elapsed Time (sec.)	DROP (ft)	DROP (cm)	H (cm)	LN(H1/H2)/∆t	Kh (cm/s)
							SETUP
1/23/2014	0.00	0	0.00	0.00	335.28	-	-
	0.10	6	0.40	12.19	323.09	6.2E-03	4.2E-03
	1.00	60	6.80	207.26	128.02	1.7E-02	1.2E-02
	3.00	180	7.50	228.60	106.68	1.5E-03	1.0E-03
	5.00	300	8.00	243.84	91.44	Invalid	Invalid
	10.00	600	8.40	256.03	79.25	Invalid	Invalid
	15.00	900	8.40	256.03	79.25	Invalid	Invalid
	Test conditions casing length)	s are no longer	valid once re	corded drops e	xceed 7.5 fee	et (i.e., the	

- 1. Falling head test was performed above depth of water table.
- 2. Soils in test zone are described as: Tan Sand, some gravel, few silt.
- 3. The SPT sample hole collapsed to a depth of 8.8 ft. below the top of casing.



Check m value:

5.6E-03 cm/s 1.0 (assumed)

Comments: Test well installed b	y Northern Drill Service (T. Tu	cker). Data recorded by AECC	M (W. Checchi)
Prepared by:	K. Harten	Reviewed by:	Jose A Camon

ATTACHMENT 4

GEOTECHNICAL LABORATORY TEST RESULTS



Client: AECOM
Project: Silverline
Location: Chelsea, MA

Location:Chelsea, MAProject No:GTX-301232Boring ID:---Sample Type:---Tested By:jekSample ID:---12/06/13Checked By:jdt

Depth: --- Test Id: 283988

pH of Soil by ASTM D4972

Boring ID	Sample ID	Depth	Visual Description	pH of Soil in Distilled Water	pH of Soil in Calcium Chloride
B-1	SPT-3	4-6 ft	Moist, light olive brown sandy clay with gravel	7.0	6.7
B-5	SPT-3	4-6 ft	Moist, light yellowish brown clay	6.9	6.4
B-15	SPT-3	4-6 ft	Moist, light olive brown clay with sand and gravel	6.7	7.2

Notes: Sample Preparation: screened through #10 sieve



Client: AECOM
Project: Silverline
Location: Chelsea, MA

Boring ID: --- Sample Type: --- Tested By: jek
Sample ID: --- Test Date: 12/27/13 Checked By: jdt

Project No:

GTX-301232

Depth: --- Test Id: 285442

pH of Soil by ASTM D4972

Boring ID	Sample ID	Depth	Visual Description	pH of Soil in Distilled Water	pH of Soil in Calcium Chloride
B-24	SPT-1	2-4 ft	Moist, olive brown clayey sand	5.9	5.5
B-33	SPT-1	2-4 ft	Dry, grayish brown silty sand with gravel	5.9	5.3

Notes: Sample Preparation: screened through #10 sieve



Client: AECOM
Project: Silverline
Location: Chelsea, N

Location:Chelsea, MAProject No:GTX-301232Boring ID:B-28Sample Type: jarTested By:jek

Sample ID: SPT-2 Sample Type: Jai Tested By: jet O1/28/14 Checked By: jdt

Depth: 9-11 ft Test Id: 287501

Test Comment: ---

Sample Description: Moist, brown sand with gravel

Sample Comment: ---

pH of Soil by ASTM D4972

Boring ID	Sample ID	Depth	Visual Description	pH of Soil in Distilled Water	pH of Soil in Calcium Chloride
B-28	SPT-2	9-11 ft	Moist, brown sand with gravel	6.0	5.9

Notes: Sample Preparation: screened through #10 sieve



Client: AECOM
Project: Silverline
Location: Chelsea, MA Project No: GTX-301232

Boring ID: --- Sample Type: --- Tested By: jek
Sample ID: --- Test Date: 01/15/14 Checked By: jdt

Depth: --- Test Id: 286941

pH of Soil by ASTM D4972

Boring ID	Sample ID	Depth	Visual Description	pH of Soil in Distilled Water	pH of Soil in Calcium Chloride
B-50	Bulk	1-5 ft	Moist, very dark brown silty sand with gravel	5.0	4.2
B-53	SPT-1	6-8 ft	Moist, very dark grayish brown silt with organics	7.1	6.6

Notes: Sample Preparation: screened through #10 sieve



Client: Aecom
Project: Silverline
Location: Chelsea, MA
GTX#: 301232

Test Date: 12/06/13

Tested By: jek Checked By: jdt

Laboratory Measurement of Soil Resistivity Using the Wenner Four-Electrode Method by ASTM G 57 (Laboratory Measurement)

Boring ID	Sample ID	Depth, ft.	Sample Description	Electrical Resistivity, ohm-cm	Electrical Conductivity, (ohm-cm) ⁻¹
B-1	SPT-3	4-6	Moist, light olive brown sandy clay with gravel	2,686	3.72E-04
B-5	SPT-3	4-6	Moist, light yellowish brown clay	2,066	4.84E-04
B-15	SPT-3	4-6	Moist, light olive brown clay with sand and gravel	2,583	3.87E-04

Notes: Water added to sample to create a thick slurry prior to testing (saturated condition).

Electrical Conductivity is calculated as inverse of Electrical Resistivity (per ASTM G 57)



Client: AECOM
Project: Silverline
Location: Chelsea, MA
GTX#: 301232

Test Date: 12/18/13
Tested By: jek

Checked By: jdt

Laboratory Measurement of Soil Resistivity Using the Wenner Four-Electrode Method by ASTM G 57 (Laboratory Measurement)

Boring ID	Sample ID	Depth, ft.	Sample Description	Electrical Resistivity, ohm-cm	Electrical Conductivity, (ohm-cm) ⁻¹
B-24	SPT-1	2-4	Moist, olive brown clayey sand	7,231	1.38E-04
B-33	SPT-1	2-4	Dry, grayish brown silty sand with gravel	11,363	8.80E-05

Notes: Water added to sample to create a thick slurry prior to testing (saturated condition).

Electrical Conductivity is calculated as inverse of Electrical Resistivity (per ASTM G 57)



Client: AECOM
Project: Silverline
Location: Chelsea, MA
GTX#: 301232

Test Date: 01/23/14

Tested By: jbr
Checked By: jdt

Laboratory Measurement of Soil Resistivity Using the Wenner Four-Electrode Method by ASTM G57 (Laboratory Measurement)

Boring ID	Sample ID	Depth, ft.	Sample Description	Electrical Resistivity, ohm-cm	Electrical Conductivity, (ohm-cm) ⁻¹
B-28	SPT-2	9-11	Moist, brown sand with gravel	10,527	9.50E-05

Notes: Water added to sample to create a thick slurry prior to testing (saturated condition).

Electrical Conductivity is calculated as inverse of Electrical Resistivity (per ASTM G57)



Client: AECOM
Project: Silverline
Location: Chlsea, MA
GTX#: 301232
Test Date: 01/10/13

Tested By: jek
Checked By: jdt

Laboratory Measurement of Soil Resistivity Using the Wenner Four-Electrode Method by ASTM G57 (Laboratory Measurement)

Boring ID	Sample ID	Depth, ft.	Sample Description	Electrical Resistivity, ohm-cm	Electrical Conductivity, (ohm-cm) ⁻¹
B-50	Bulk	1-5	Moist, very dark brown silty sand with gravel	30,991	3.23E-05
B-53	SPT-1	6-8	Moist, very dark grayish brown silt with organics	537	1.86E-03

Notes: Water added to sample to create a thick slurry prior to testing (saturated condition).

Electrical Conductivity is calculated as inverse of Electrical Resistivity (per ASTM G57)



Client: **AECOM** Project: Silverline

Location: Chelsea, MA Boring ID: B-1

Sample Type: jar Test Date: 12/06/13

283981

Test Id:

Project No: Tested By: jbr Checked By: jdt

GTX-301232

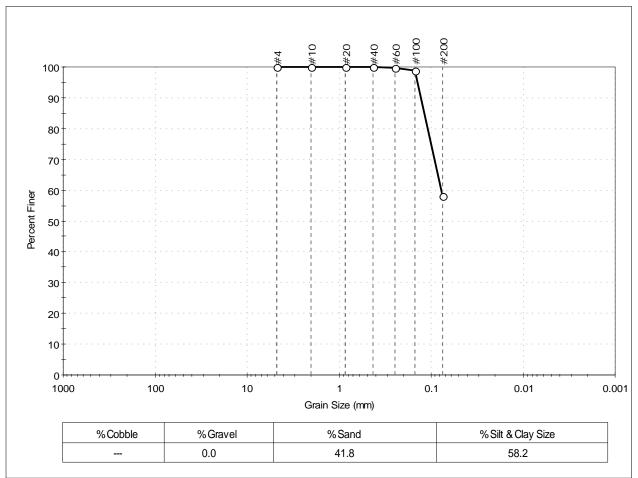
Sample ID: SPT-6 Depth : 19-21 ft

Test Comment:

Sample Description: Moist, very dark olive gray sandy silt

Sample Comment:

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	100		
#100	0.15	99		
#200	0.075	58		

<u>Coefficients</u>					
$D_{85} = 0.1185 \text{ mm}$	$D_{30} = N/A$				
$D_{60} = 0.0774 \text{ mm}$	$D_{15} = N/A$				
$D_{50} = N/A$	$D_{10} = N/A$				
$C_u = N/A$	$C_c = N/A$				

<u>Classification</u> Sandy silt (ML) **ASTM**

AASHTO Silty Soils (A-4 (0))

Sample/Test Description Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness: ---

printed 12/6/2013 12:39:02 PM



Client: AECOM
Project: Silverline
Location: Chelsea, I

Location: Chelsea, MA

Boring ID: B-3 Sample Type: bucket

Project No: bucket Tested By:

GTX-301232

jbr

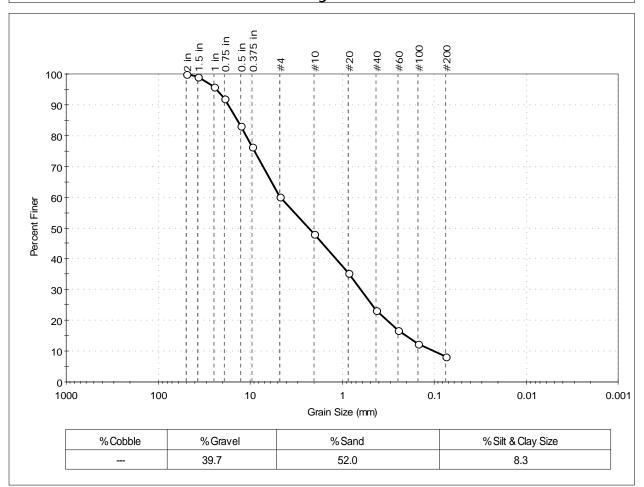
Sample ID: Bulk Test Date: 12/20/13 Checked By: jdt Depth: 0-4 ft Test Id: 285454

Test Comment: ---

Sample Description: Moist, very dark gray sand with silt and gravel

Sample Comment: ---

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2 in	50.00	100		
1.5 in	37.50	99		
1 in	25.00	96		
0.75 in	19.00	92		
0.5 in	12.70	83		
0.375 in	9.50	76		
#4	4.75	60		
#10	2.00	48		
#20	0.85	36		
#40	0.42	23		
#60	0.25	17		
#100	0.15	12		
#200	0.075	8		

<u>Coefficients</u>				
D ₈₅ = 13.8664 mm	$D_{30} = 0.6205 \text{ mm}$			
D ₆₀ = 4.6463 mm	$D_{15} = 0.2011 \text{ mm}$			
D ₅₀ = 2.2890 mm	$D_{10} = 0.0994 \text{ mm}$			
$C_u = 46.743$	$C_c = 0.834$			

<u>ASTM</u>	Classification N/A
<u>AASHTO</u>	Stone Fragments, Gravel and Sand (A-1-a (1))

Sample/Test Description
Sand/Gravel Particle Shape: ROUNDED
Sand/Gravel Hardness: HARD

printed 12/27/2013 11:18:16 AM



Client: **AECOM** Project: Silverline

Location: Chelsea, MA Boring ID: B-5 Sample Type: jar

Tested By: jbr Sample ID: SPT-6 Test Date: Checked By: jdt 12/06/13

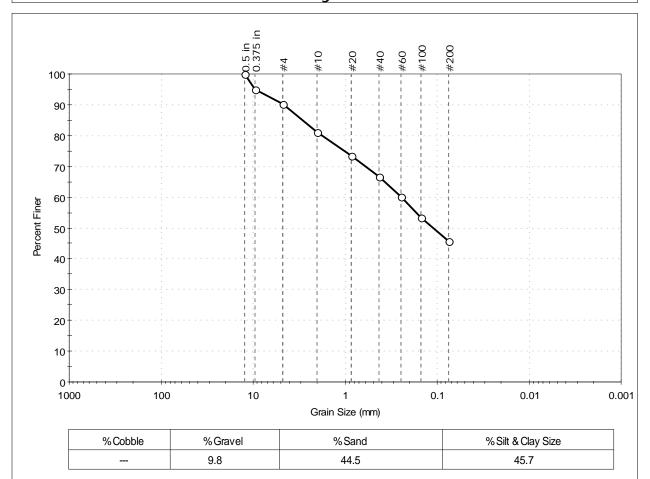
Depth : Test Id: 283982 12-14 ft

Test Comment:

Sample Description: Moist, olive gray clayey sand

Sample Comment:

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	95		
#4	4.75	90		
#10	2.00	81		
#20	0.85	73		
#40	0.42	67		
#60	0.25	60		
#100	0.15	53		
#200	0.075	46		

<u>Coefficients</u>					
D ₈₅ = 2.9021 mm	$D_{30} = N/A$				
D ₆₀ = 0.2466 mm	$D_{15} = N/A$				
D ₅₀ = 0.1115 mm	$D_{10} = N/A$				
C _u =N/A	$C_c = N/A$				

Project No:

GTX-301232

Classification Clayey sand (SC) <u>ASTM</u>

AASHTO Silty Soils (A-4 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED

Sand/Gravel Hardness: HARD

printed 12/6/2013 12:39:03 PM



Client: **AECOM** Project: Silverline

Sample ID: SPT-4

Depth :

Location: Chelsea, MA Boring ID: B-17

Project No: Sample Type: jar Tested By: Test Date: Checked By: 12/06/13

GTX-301232

jbr

jdt

Test Id: 283983

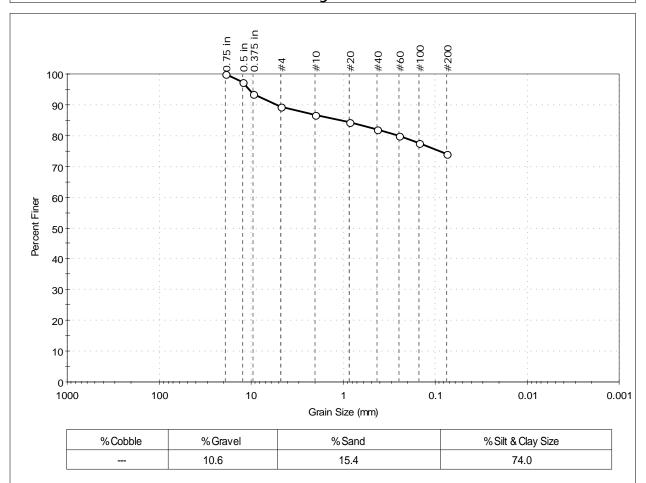
Test Comment:

9-11 ft

Sample Description: Moist, olive gray clay with sand

Sample Comment:

Particle Size Analysis - ASTM D422



	Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
	0.75 in	19.00	100		
	0.5 in	12.50	97		
Г	0.375 in	9.50	93		
	#4	4.75	89		
	#10	2.00	87		
Г	#20	0.85	84		
	#40	0.42	82		
	#60	0.25	80		
	#100	0.15	78		
	#200	0.075	74		
Г					
$\overline{}$		1			

<u>Coefficients</u>		
D ₈₅ = 1.0344 mm	$D_{30} = N/A$	
D ₆₀ = N/A	$D_{15} = N/A$	
$D_{50} = N/A$	$D_{10} = N/A$	
C _{II} =N/A	$C_c = N/A$	

<u>Classification</u> lean clay with sand (CL) <u>ASTM</u>

AASHTO Clayey Soils (A-6 (10))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED

Sand/Gravel Hardness: HARD

printed 12/6/2013 12:39:04 PM



Client: AECOM
Project: Silverline
Location: Chelsea, MA

Boring ID: B-18 Sample Type: jar
Sample ID: SPT-5 Test Date: 01/

Test Date: 01/15/14

Project No:

Tested By:

Checked By: jdt

GTX-301232

jbr

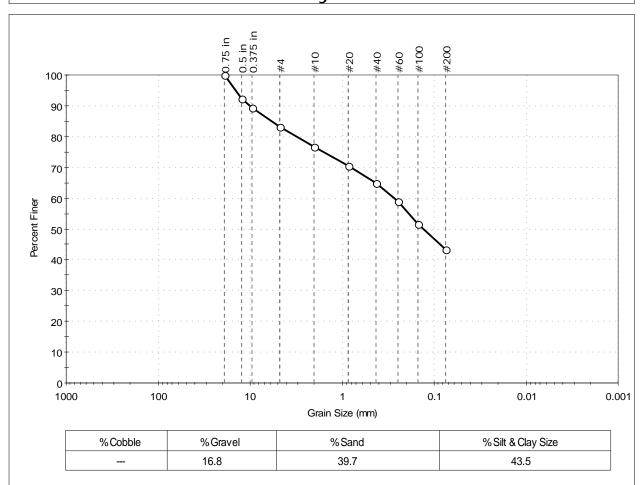
Depth: 19-21 ft Test Id: 286936

Test Comment: ---

Sample Description: Moist, greenish gray clayey sand with gravel

Sample Comment: ---

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	92		
0.375 in	9.50	89		
#4	4.75	83		
#10	2.00	77		
#20	0.85	71		
#40	0.42	65		
#60	0.25	59		
#100	0.15	52		
#200	0.075	43		

<u>Coefficients</u>			
D ₈₅ = 5.8445 mm	$D_{30} = N/A$		
D ₆₀ = 0.2752 mm	$D_{15} = N/A$		
D ₅₀ = 0.1301 mm	$D_{10} = N/A$		
C _u =N/A	C _c =N/A		

Classification

ASTM Clayey sand with gravel (SC)

AASHTO Silty Soils (A-4 (1))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED

Sand/Gravel Hardness: HARD

printed 1/23/2014 10:59:52 AM



Client: AECOM Project: Silverline

Location:Chelsea, MAProject No:GTX-301232Boring ID:B-21Sample Type: bagTested By:jbrSample ID:BulkTest Date:01/15/14Checked By:jdt

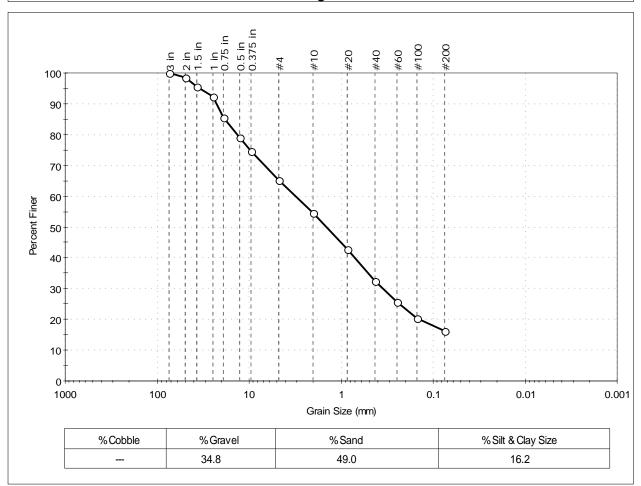
Depth: 0-10 ft Test Id: 286921

Test Comment: ---

Sample Description: Moist, very dark gray silty sand with gravel

Sample Comment: ---

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
3 in	75.00	100		
2 in	50.00	99		
1.5 in	37.50	96		
1 in	25.00	92		
0.75 in	19.00	86		
0.5 in	12.70	79		
0.375 in	9.50	75		
#4	4.75	65		
#10	2.00	55		
#20	0.85	43		
#40	0.42	33		
#60	0.25	26		
#100	0.15	20		
#200	0.075	16		

<u>Coefficients</u>			
D ₈₅ = 18.2321 mm	$D_{30} = 0.3487 \text{ mm}$		
D ₆₀ = 3.1170 mm	$D_{15} = N/A$		
D ₅₀ = 1.4336 mm	$D_{10} = N/A$		
$C_u = N/A$	$C_{C} = N/A$		

ASTM N/A Classification
N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample/Test Description
Sand/Gravel Particle Shape: ROUNDED
Sand/Gravel Hardness: HARD

printed 1/23/2014 10:59:53 AM



Client: AECOM
Project: Silverline

Location: Chelsea, MA

Boring ID: B-26 Sample Type: bucket

 Sample ID: Bulk (B26A / B26)
 Test Date:
 02/12/14

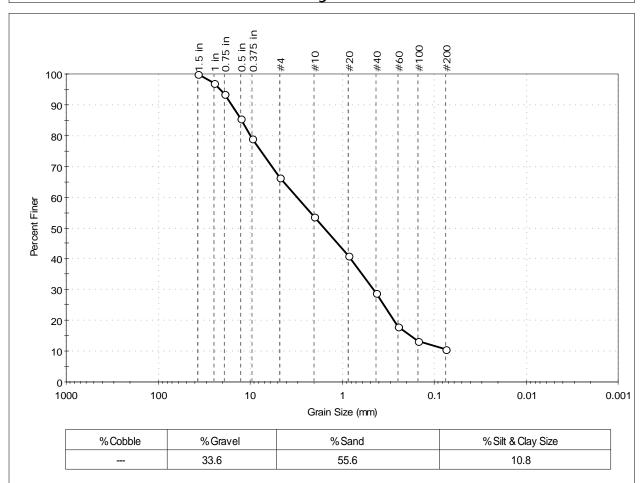
 Depth:
 1-4 ft
 Test Id:
 288468

Depth: 1-4 ft
Test Comment:

Sample Description: Moist, very dark gray sand with silt and gravel

Sample Comment: ---

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	97		
0.75 in	19.00	94		
0.5 in	12.70	85		
0.375 in	9.50	79		
#4	4.75	66		
#10	2.00	54		
#20	0.85	41		
#40	0.42	29		
#60	0.25	18		
#100	0.15	13		
#200	0.075	11		

<u>Coefficients</u>			
$D_{85} = 12.4412 \text{ mm}$	$D_{30} = 0.4503 \text{ mm}$		
$D_{60} = 3.0602 \text{ mm}$	$D_{15} = 0.1799 \text{ mm}$		
$D_{50} = 1.5470 \text{ mm}$	$D_{10} = 0.0615 \text{ mm}$		
$C_u = 49.759$	$C_c = 1.077$		

Project No:

Tested By:

Checked By: jdt

GTX-301232

jbr

ASTM N/A Classification

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED

Sand/Gravel Hardness: HARD

printed 2/13/2014 8:15:24 AM



Client: **AECOM** Project: Silverline

Location: Chelsea, MA Boring ID: B-28A

Sample Type: jar

Project No: GTX-301232 Tested By: jbr

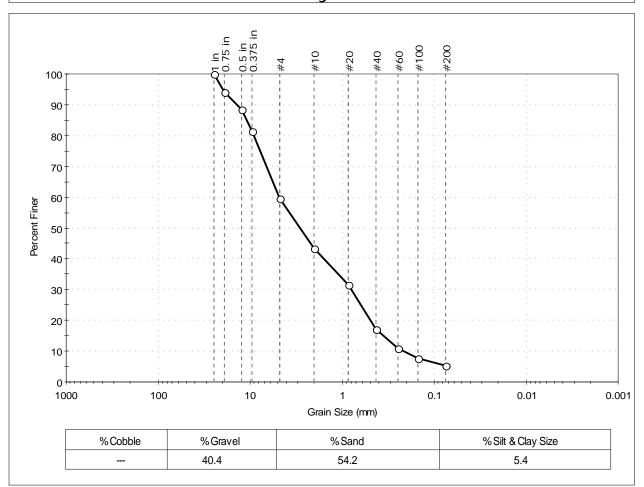
01/24/14 Sample ID: SPT-4 Test Date: Checked By: jdt Depth: Test Id: 287500 19-21 ft

Test Comment:

Sample Description: Moist, light olive brown sand with silt and gravel

Sample Comment:

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	94		
0.5 in	12.50	88		
0.375 in	9.50	82		
#4	4.75	60		
#10	2.00	43		
#20	0.85	31		
#40	0.42	17		
#60	0.25	11		
#100	0.15	8		
#200	0.075	5		

<u>Coefficients</u>			
$D_{85} = 10.9185 \text{ mm}$	$D_{30} = 0.7924 \text{ mm}$		
$D_{60} = 4.8119 \text{ mm}$	$D_{15} = 0.3524 \text{ mm}$		
$D_{50} = 2.8567 \text{ mm}$	$D_{10} = 0.2154 \text{ mm}$		
$C_u = 22.339$	$C_c = 0.606$		

Classification <u>ASTM</u> N/A AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED Sand/Gravel Hardness: HARD

printed 1/31/2014 8:00:05 AM



Client: AECOM Project: Silverline

Location: Chelsea, MA Boring ID: B-30 Sample Type: bucket

Project No: Tested By:

02/12/14

GTX-301232

jbr

Checked By: jdt

Sample ID: Bulk (B31 / B32) Test Date: Depth :

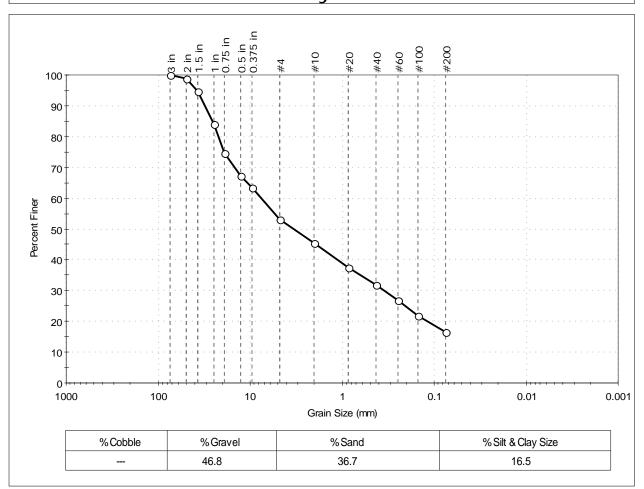
Test Id: 288469 1-3 ft

Test Comment:

Sample Description: Moist, black silty gravel with sand

Sample Comment:

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2 1-	75.00	100		
3 in	75.00	100		
2 in	50.00	99		
1.5 in	37.50	95		
1 in	25.00	84		
0.75 in	19.00	75		
0.5 in	12.70	67		
0.375 in	9.50	63		
#4	4.75	53		
#10	2.00	46		
#20	0.85	38		
#40	0.42	32		
#60	0.25	27		
#100	0.15	22		
#200	0.075	16		

<u>Coefficients</u>			
D ₈₅ = 25.7992 mm	$D_{30} = 0.3487 \text{ mm}$		
D ₆₀ = 7.5245 mm	$D_{15} = N/A$		
D ₅₀ = 3.3132 mm	$D_{10} = N/A$		
$C_u = N/A$	$C_{C} = N/A$		

<u>ASTM</u>	N/A
<u>AASHTO</u>	Stone Fragments, Gravel and Sand (A-1-b (0))

Classification

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED Sand/Gravel Hardness: HARD

printed 2/13/2014 8:20:07 AM



Client: AECOM
Project: Silverline

Location: Chelsea, MA

Boring ID: B-33 Sample Type: jar

Sample Type: jar Tested By: jbr Test Date: 12/23/13 Checked By: jdt

Project No:

GTX-301232

 Sample ID: SPT-6
 Test Date:
 12/23/1

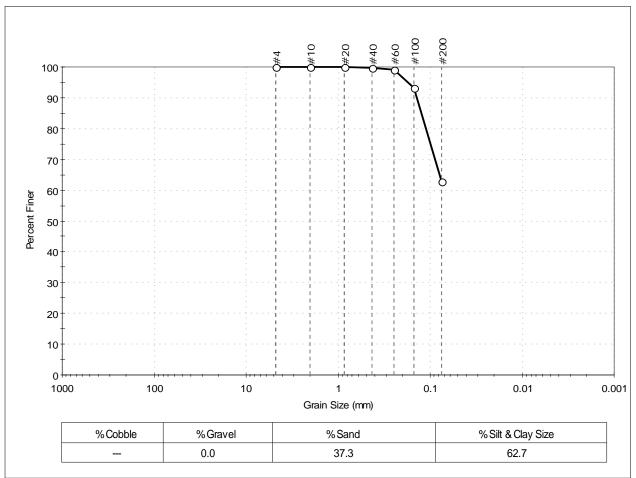
 Depth:
 24-26 ft
 Test Id:
 285453

Test Comment: ---

Sample Description: Moist, olive brown sandy silt

Sample Comment: ---

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	100		
#40	0.42	100		
#60	0.25	99		
#100	0.15	93		
#200	0.075	63		

<u>Coefficients</u>		
$D_{85} = 0.1246 \text{ mm}$	$D_{30} = N/A$	
$D_{60} = N/A$	$D_{15} = N/A$	
$D_{50} = N/A$	$D_{10} = N/A$	
$C_u = N/A$	$C_c = N/A$	

ASTM N/A Classification

AASHTO Silty Soils (A-4 (0))

Sample/Test Description
Sand/Gravel Particle Shape: ---

Sand/Gravel Hardness : ---

printed 12/27/2013 11:18:17 AM



Client: **AECOM** Project: Silverline

Sample ID: Bulk

Location: Chelsea, MA Boring ID: B-37

Sample Type: bag Test Date: 01/15/14

Project No: GTX-301232 Tested By: jbr Checked By: jdt

Test Id: 286920

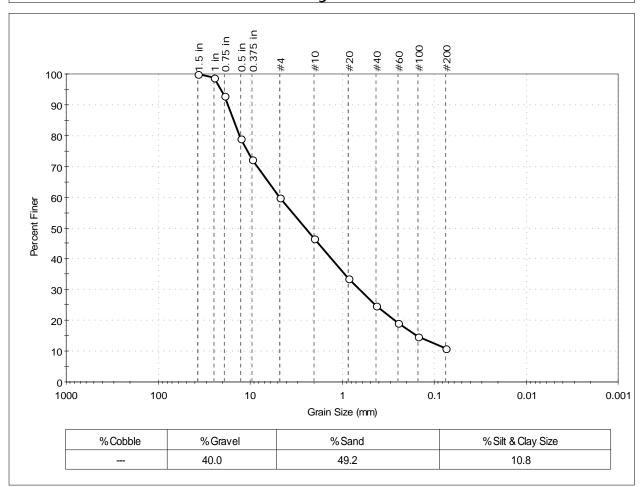
Depth: Test Comment:

1-5 ft

Sample Description: Moist, dark grayish brown sand with silt and gravel

Sample Comment:

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	99		
0.75 in	19.00	93		
0.5 in	12.70	79		
0.375 in	9.50	72		
#4	4.75	60		
#10	2.00	46		
#20	0.85	34		
#40	0.42	25		
#60	0.25	19		
#100	0.15	15		
#200	0.075	11		

<u>Coefficients</u>			
$D_{85} = 15.1130 \text{ mm}$	$D_{30} = 0.6408 \text{ mm}$		
$D_{60} = 4.7508 \text{ mm}$	$D_{15} = 0.1519 \text{ mm}$		
$D_{50} = 2.5044 \text{ mm}$	$D_{10} = 0.0657 \text{ mm}$		
C _u =72.311	C _c =1.316		

Classification <u>ASTM</u> N/A AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED Sand/Gravel Hardness: HARD

printed 1/23/2014 10:59:53 AM



Client: AECOM
Project: Silverline

Sample ID: SPT-2

Location: Chelsea, MA

Boring ID: B-38

Sample Type: jar Test Date: 01/15/14 Project No: GTX-301232
Tested By: jbr

Tested By: jbr Checked By: jdt

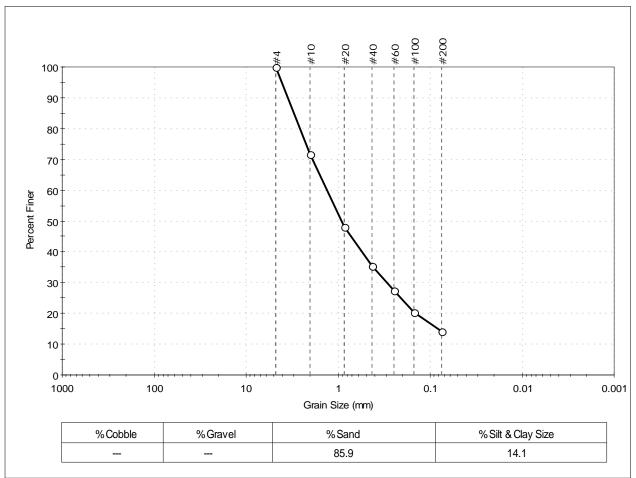
Depth: 10-12 ft Test Id: 286935

Test Comment: ---

Sample Description: Moist, dark brown silty sand with organics

Sample Comment: ---

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	72		
#20	0.85	48		
#40	0.42	36		
#60	0.25	27		
#100	0.15	20		
#200	0.075	14		

<u>Coefficients</u>			
D ₈₅ = 3.0041 mm	$D_{30} = 0.2964 \text{ mm}$		
D ₆₀ = 1.3068 mm	$D_{15} = 0.0829 \text{ mm}$		
D ₅₀ = 0.9077 mm	$D_{10} = 0.0481 \text{ mm}$		
$C_u = 27.168$	$C_c = 1.398$		

ASTM N/A Classification
N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED

Sand/Gravel Hardness: SOFT

printed 1/23/2014 10:59:54 AM



Client: AECOM
Project: Silverline

Sample ID: Bulk

Location: Chelsea, MA

Boring ID: B-39 Sample Type: bag

Sample Type: bag Tested By: jbr Test Date: 01/15/14 Checked By: jdt

Project No:

GTX-301232

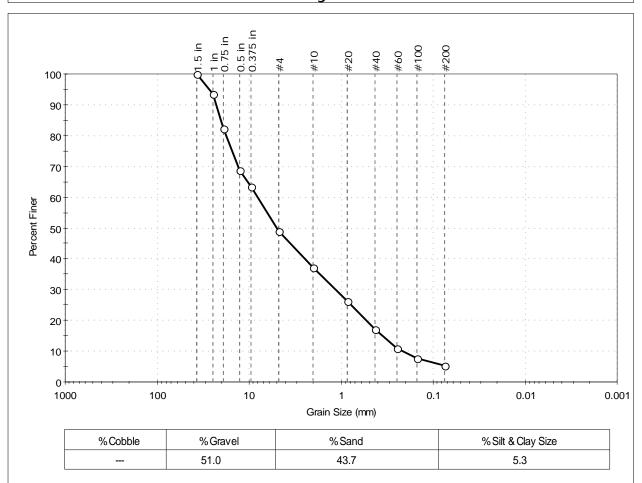
Depth: 1-5 ft Test Id: 286919

Test Comment: ---

Sample Description: Moist, very dark grayish brown gravel with silt and sand

Sample Comment: ---

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	94		
0.75 in	19.00	82		
0.5 in	12.70	69		
0.375 in	9.50	63		
#4	4.75	49		
#10	2.00	37		
#20	0.85	26		
#40	0.42	17		
#60	0.25	11		
#100	0.15	8		
#200	0.075	5		

<u>Coefficients</u>			
$D_{85} = 20.2439 \text{ mm}$	$D_{30} = 1.1470 \text{ mm}$		
$D_{60} = 8.0919 \text{ mm}$	$D_{15} = 0.3514 \text{ mm}$		
$D_{50} = 4.9903 \text{ mm}$	$D_{10} = 0.2149 \text{ mm}$		
$C_{11} = 37.654$	$C_c = 0.757$		

ASTM N/A Classification

AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED

Sand/Gravel Hardness: HARD

printed 1/23/2014 10:59:55 AM



Client: **AECOM** Project: Silverline

Location: Chelsea, MA

Sample Type: bag

Project No: GTX-301232 jbr

Boring ID: B-41 Tested By: Sample ID: Bulk Test Date: 01/15/14 Checked By: jdt 286918

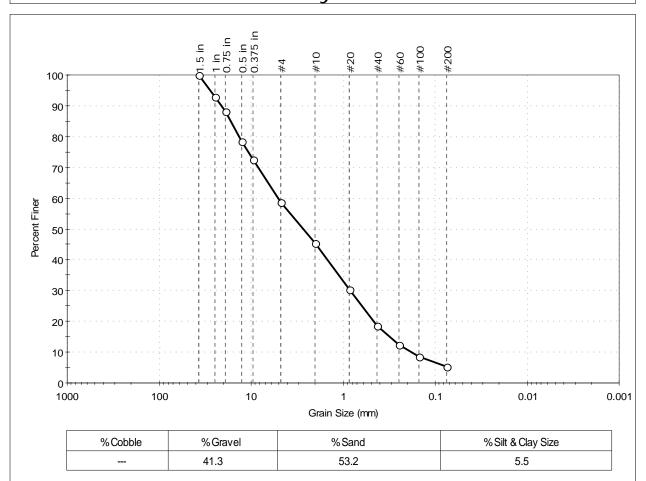
Depth: Test Id: 1-5 ft

Test Comment:

Sample Description: Moist, very dark gray sand with silt and gravel

Sample Comment:

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1.5 in	37.50	100		
1 in	25.00	93		
0.75 in	19.00	88		
0.5 in	12.70	79		
0.375 in	9.50	73		
#4	4.75	59		
#10	2.00	45		
#20	0.85	30		
#40	0.42	19		
#60	0.25	12		
#100	0.15	8		
#200	0.075	5		

<u>Coefficients</u>			
$D_{85} = 16.6075 \text{ mm}$	$D_{30} = 0.8282 \text{ mm}$		
$D_{60} = 5.0819 \text{ mm}$	$D_{15} = 0.3139 \text{ mm}$		
$D_{50} = 2.6934 \text{ mm}$	$D_{10} = 0.1852 \text{ mm}$		
$C_u = 27.440$	$C_c = 0.729$		

Classification <u>ASTM</u> N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED

Sand/Gravel Hardness: HARD

printed 1/23/2014 10:59:55 AM



Client: AECOM
Project: Silverline

Location:Chelsea, MAProject No:Boring ID:B-44Sample Type: jarTested By:Sample ID:SPT-1Test Date:01/24/14Checked By:

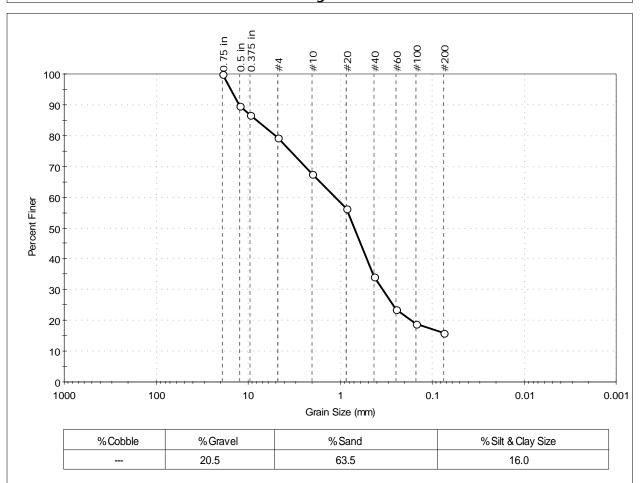
Depth: 6-8 ft Test Id: 287516

Test Comment: ---

Sample Description: Moist, yellowish brown silty, clayey sand with gravel

Sample Comment: ---

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	90		
0.375 in	9.50	87		
#4	4.75	79		
#10	2.00	68		
#20	0.85	56		
#40	0.42	34		
#60	0.25	24		
#100	0.15	19		
#200	0.075	16		
			l	

<u>Coefficients</u>			
D ₈₅ = 7.9938 mm	$D_{30} = 0.3433 \text{ mm}$		
D ₆₀ = 1.1164 mm	$D_{15} = N/A$		
D ₅₀ = 0.6948 mm	$D_{10} = N/A$		
$C_u = N/A$	$C_c = N/A$		

GTX-301232

jbr

jdt

<u>Classification</u>

ASTM Silty, clayey sand with gravel (SC-SM)

AASHTO Clayey Gravel and Sand (A-2-7 (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED

Sand/Gravel Hardness: HARD

printed 1/31/2014 8:00:07 AM



Client: **AECOM** Project: Silverline

Location: Chelsea, MA

Sample Type: bag

Project No: GTX-301232

Boring ID: B-48 Tested By: jbr Sample ID: Bulk Test Date: 01/17/14 Checked By:

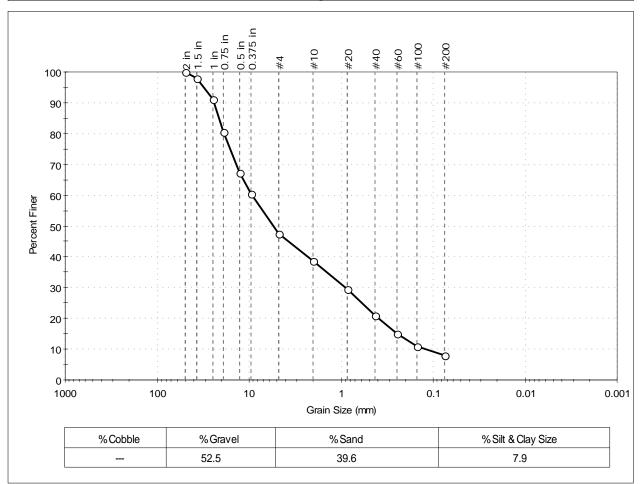
Depth: Test Id: 286917 1-5 ft

Test Comment:

Sample Description: Moist, very dark gray gravel with silt and sand

Sample Comment:

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies		
2 in	50.00	100				
1.5 in	37.50	98				
1 in	25.00	91				
0.75 in	19.00	81				
0.5 in	12.70	67				
0.375 in	9.50	61				
#4	4.75	47				
#10	2.00	39				
#20	0.85	29				
#40	0.42	21				
#60	0.25	15				
#100	0.15	11				
#200	0.075	8				

<u>Coefficients</u>								
$D_{85} = 21.3111 \text{ mm}$	$D_{30} = 0.8978 \text{ mm}$							
$D_{60} = 9.2491 \text{ mm}$	$D_{15} = 0.2515 \text{ mm}$							
$D_{50} = 5.4382 \text{ mm}$	$D_{10} = 0.1218 \text{ mm}$							
$C_u = 75.937$	$C_c = 0.716$							

Classification **ASTM** N/A AASHTO Stone Fragments, Gravel and Sand (A-1-a (1))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED Sand/Gravel Hardness: HARD

printed 1/23/2014 10:59:56 AM



Client: AECOM
Project: Silverline

Sample ID: SPT-1

Project: Silverline
Location: Chelsea, MA
Boring ID: B-52

Sample Type: jar Test Date: 01/27/14

287515

Project No:
Tested By: jbr
Checked By: jdt

GTX-301232

Depth: 6-8 ft

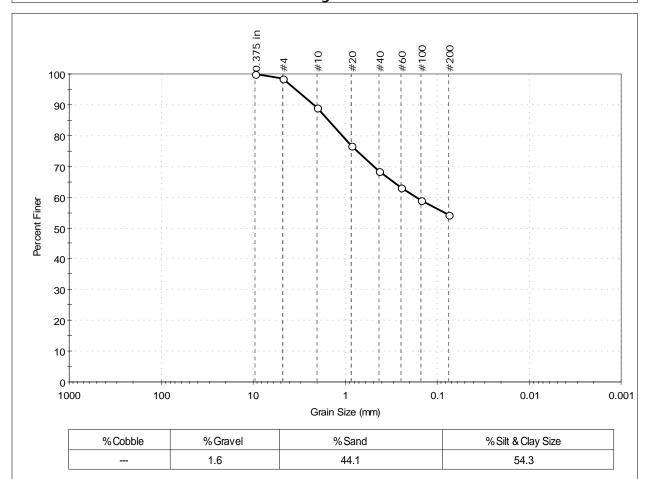
Test Comment: --Sample Description: Wet, v

Wet, very dark brown sandy silt

Test Id:

Sample Comment: --

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	ve Size, mm Percent Finer Spec. Per		Complies
0.375 in	9.50	100		
#4	4.75	98		
#10	2.00	89		
#20	0.85	77		
#40	0.42	69		
#60	0.25	63		
#100	0.15	59		
#200	0.075	54		

<u>Coefficients</u>							
$D_{85} = 1.5172 \text{ mm}$	$D_{30} = N/A$						
$D_{60} = 0.1695 \text{ mm}$	$D_{15} = N/A$						
$D_{50} = N/A$	$D_{10} = N/A$						
$C_u = N/A$	$C_C = N/A$						

	<u>Classification</u>
<u>ASTM</u>	Sandy elastic silt (MH)

AASHTO Clayey Soils (A-7-5 (13))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED

Sand/Gravel Hardness: HARD

printed 1/31/2014 8:00:06 AM



Client: **AECOM** Project: Silverline

Location: Chelsea, MA Boring ID: B-57

Sample Type: bag Test Date: 01/17/14

286916

Test Id:

Project No: Tested By: jbr

Checked By: jdt

GTX-301232

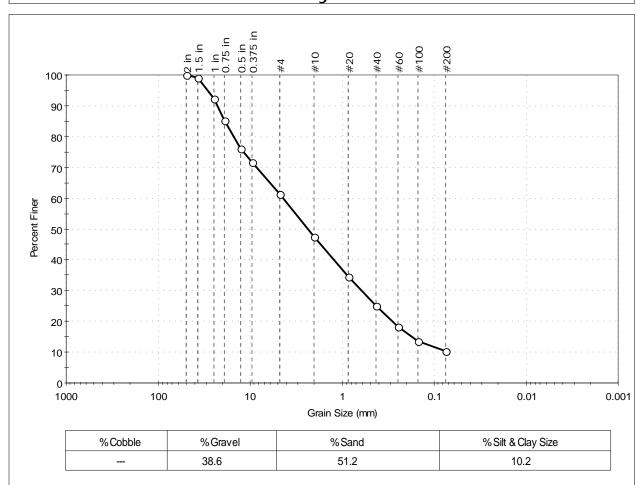
Depth: 1-5 ft

Sample ID: Bulk

Test Comment: Sample Description: Moist, very dark gray sand with silt and gravel

Sample Comment:

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2 in	50.00	100		
1.5 in	37.50	99		
1 in	25.00	92		
0.75 in	19.00	85		
0.5 in	12.70	76		
0.375 in	9.50	72		
#4	4.75	61		
#10	2.00	48		
#20	0.85	35		
#40	0.42	25		
#60	0.25	18		
#100	0.15	13		
#200	0.075	10		

<u>Coefficients</u>								
$D_{85} = 18.7827 \text{ mm}$	$D_{30} = 0.6061 \text{ mm}$							
$D_{60} = 4.3452 \text{ mm}$	$D_{15} = 0.1766 \text{ mm}$							
$D_{50} = 2.3218 \text{ mm}$	$D_{10} = 0.0712 \text{ mm}$							
$C_u = 61.028$	$C_c = 1.187$							

Classification

<u>ASTM</u> N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

<u>Sample/Test Description</u> Sand/Gravel Particle Shape: ROUNDED Sand/Gravel Hardness: HARD

printed 1/23/2014 10:59:56 AM



Client: **AECOM** Project: Silverline

Sample ID: SPT-2

Depth :

Location: Chelsea, MA Boring ID: B-59

Sample Type: jar Test Date: 01/27/14

Project No: GTX-301232 Tested By: jbr Checked By: jdt

Test Id: 287517

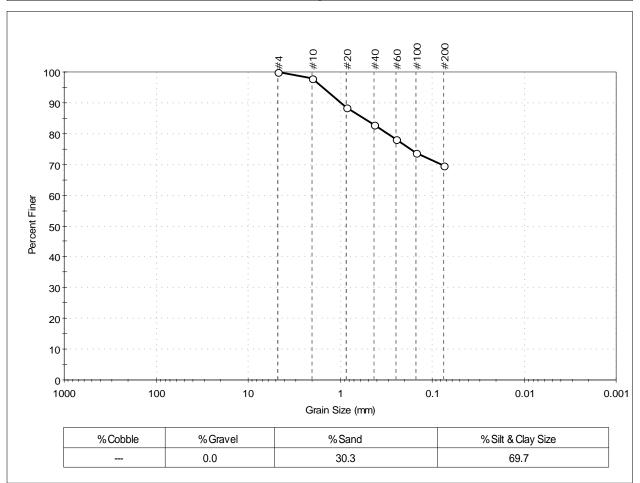
Test Comment:

10-12 ft

Sample Description: Moist, very dark brown sandy organic silt

Sample Comment:

Particle Size Analysis - ASTM D422



Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	98		
#20	0.85	88		
#40	0.42	83		
#60	0.25	78		
#100	0.15	74		
#200	0.075	70		

<u>Coefficients</u>									
D ₈₅ = 0.5580 mm	$D_{30} = N/A$								
D ₆₀ = N/A	$D_{15} = N/A$								
$D_{50} = N/A$	$D_{10} = N/A$								
$C_u = N/A$	$C_c = N/A$								

<u>Classification</u> Sandy organic silt (OH) <u>ASTM</u>

AASHTO Clayey Soils (A-7-5 (72))

Sample/Test Description Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness: ---

printed 1/31/2014 8:00:08 AM



Client: AECOM
Project: Silverline
Location: Chelsea, MA Project No: GTX-301232

Boring ID: B-1 Sample Type: tube Tested By: cam Sample ID: ST-5 Test Date: 12/06/13 Checked By: jdt

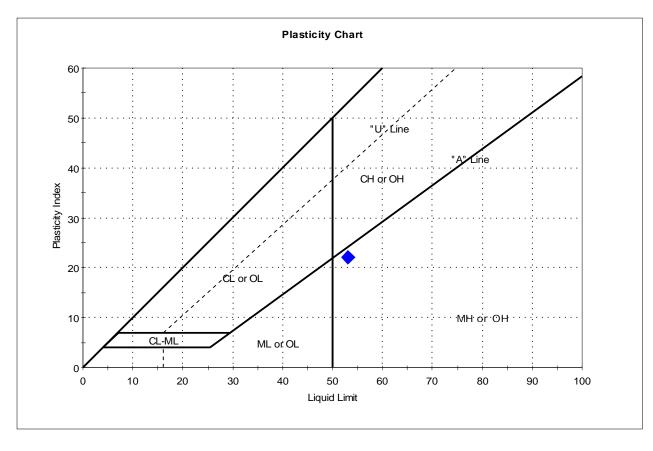
Depth: 14-16 ft Test Id: 283977

Test Comment: ---

Sample Description: Moist, dark grayish brown silt

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbo	I Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	ST-5	B-1	14-16 ft	55	53	32	21	1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW
Toughness: MEDIUM

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Client: AECOM
Project: Silverline

Location:Chelsea, MAProject No:GTX-301232Boring ID:B-1Sample Type: jarTested By:cam

283978

Boring ID: B-1 Sample Type: jar Tested By: car Sample ID: SPT-6 Test Date: 12/06/13 Checked By: jdt

Depth: 19-21 ft Test Id:

Test Comment: --

Sample Description: Moist, very dark olive gray sandy silt

Sample Comment: ---

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-6	B-1	19-21 ft	31	n/a	n/a	n/a	n/a	Sandy silt (ML)

0% Retained on #40 Sieve Dry Strength: MEDIUM Dilatancy: RAPID Toughness: n/a

The sample was determined to be Non-Plastic



Client: AECOM
Project: Silverline

Location:Chelsea, MAProject No:GTX-301232Boring ID:B-2Sample Type: jarTested By:cam

Boring ID: B-2 Sample Type: jar Tested By: cam Sample ID: SPT-5 Test Date: 12/24/13 Checked By: jdt

Depth: 20-22 ft Test Id: 285450

Test Comment: ---

Sample Description: Moist, dark olive gray clayey sand

Sample Comment: ---

Atterberg Limits - ASTM D4318

Sample Determined to be non-plastic

Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-5	B-2	20-22 ft	37	n/a	n/a	n/a	n/a	

Dry Strength: HIGH Dilatancy: RAPID Toughness: n/a

The sample was determined to be Non-Plastic



Client: AECOM
Project: Silverline
Location: Chelsea, MA
Project No: GTX-301232

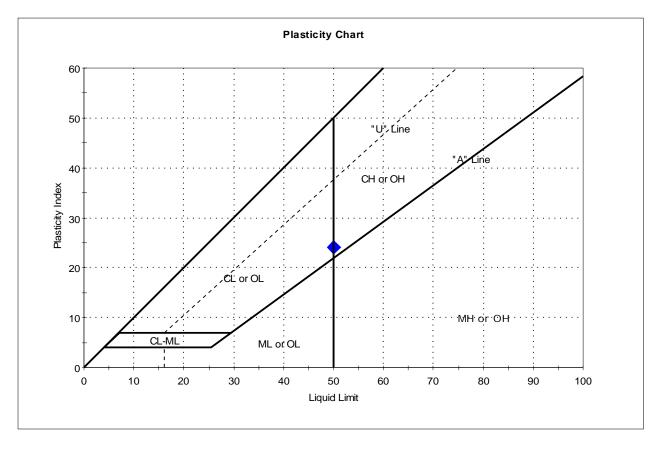
Boring ID: B-3 Sample Type: jar Tested By: cam
Sample ID: SPT-4 Test Date: 12/24/13 Checked By: jdt

Depth: 15-17 ft Test Id: 285449

Test Comment: ---

Sample Description: Moist, dark olive gray clay
Sample Comment: Sample contains shell fragments

Atterberg Limits - ASTM D4318



Symbo	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-4	B-3	15-17 ft	45	50	26	24	1	

Sample Prepared using the WET method

Dry Strength: HIGH Dilatancy: SLOW Toughness: LOW



Client: AECOM
Project: Silverline
Location: Chelsea, MA Project No: GTX-301232

Boring ID: B-5 Sample Type: jar Tested By: cam Sample ID: SPT-6 Test Date: 12/06/13 Checked By: jdt

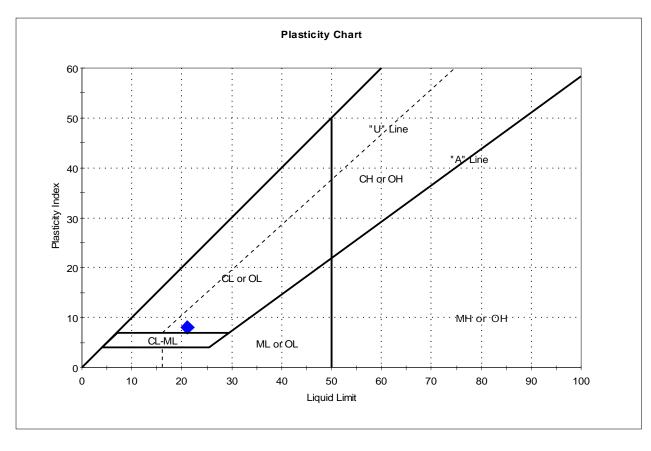
Depth: 12-14 ft Test Id: 283979

Test Comment: ---

Sample Description: Moist, olive gray clayey sand

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-6	B-5	12-14 ft	10	21	13	8	0	Clayey sand (SC)

Sample Prepared using the WET method

33% Retained on #40 Sieve Dry Strength: VERY HIGH

Dilatancy: SLOW
Toughness: MEDIUM

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Client: AECOM
Project: Silverline
Location: Chelsea, MA
Project No: GTX-301232

Boring ID: B-17 Sample Type: jar Tested By: cam Sample ID: SPT-4 Test Date: 12/06/13 Checked By: jdt

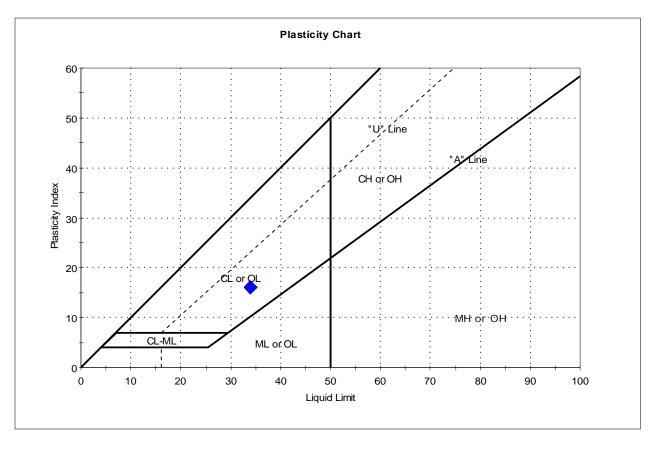
Depth: 9-11 ft Test Id: 283980

Test Comment: ---

Sample Description: Moist, olive gray clay with sand

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-4	B-17	9-11 ft	17	34	18	16	0	lean clay with sand (CL)

Sample Prepared using the WET method

18% Retained on #40 Sieve Dry Strength: VERY HIGH

Dilatancy: SLOW
Toughness: MEDIUM

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Client: AECOM
Project: Silverline
Location: Chelsea, MA
Project No: GTX-301232

Boring ID: B-18 Sample Type: jar Tested By: cam Sample ID: SPT-5 Test Date: 01/15/14 Checked By: jdt

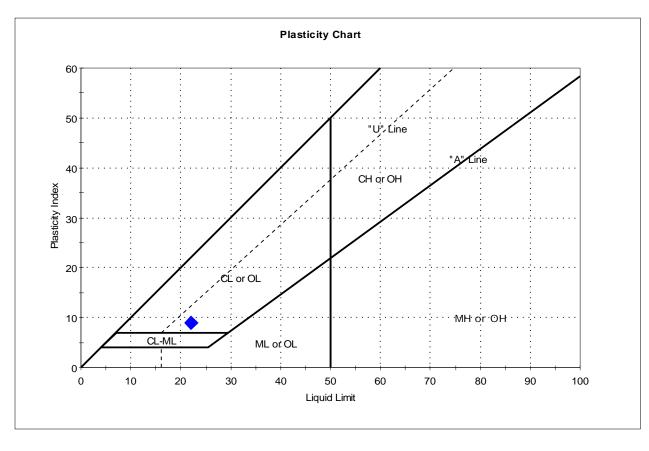
Depth: 19-21 ft Test Id: 286937

Test Comment: ---

Sample Description: Moist, greenish gray clayey sand with gravel

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-5	B-18	19-21 ft	10	22	12	10	0	Clayey sand with gravel (SC)

Sample Prepared using the WET method

35% Retained on #40 Sieve Dry Strength: VERY HIGH

Dilatancy: SLOW Toughness: LOW

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Client: AECOM
Project: Silverline
Location: Chelsea, MA
Project No: GTX-301232

Boring ID: B-22 Sample Type: jar Tested By: cam Sample ID: SPT-5 Test Date: 12/20/13 Checked By: jdt

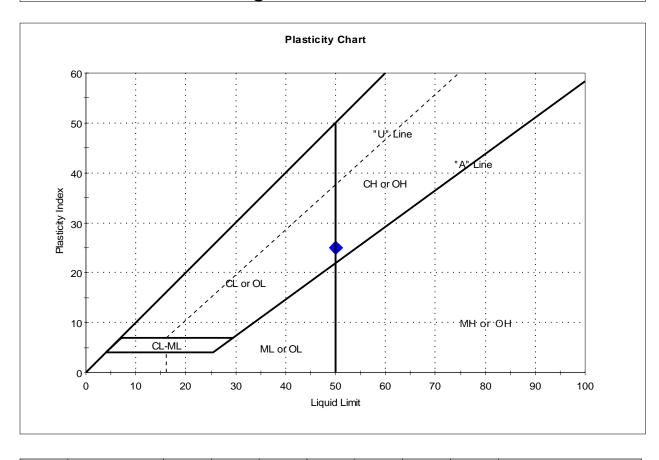
Depth: 14-16 ft Test Id: 285451

Test Comment: ---

Sample Description: Moist, olive gray clay

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-5	B-22	14-16 ft	27	50	25	25	0	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW Toughness: LOW

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Client: AECOM
Project: Silverline
Location: Chelsea, MA Project No: GTX-301232

Boring ID: B-36 Sample Type: jar Tested By: cam Sample ID: SPT-3 Test Date: 01/28/14 Checked By: jdt

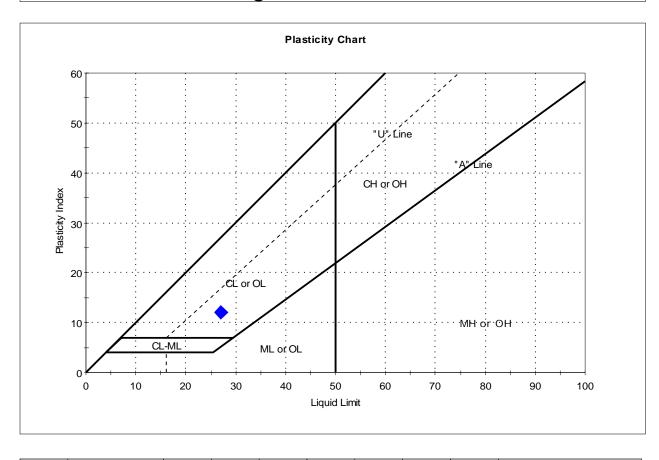
Depth: 9-11 ft Test Id: 287496

Test Comment: ---

Sample Description: Moist, very dark gray clay

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-3	B-36	9-11 ft	20	27	15	12	0	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW Toughness: LOW

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Client: AECOM
Project: Silverline
Location: Chelsea, MA
Project No: GTX-301232

Boring ID: B-36 Sample Type: jar Tested By: cam Sample ID: SPT-9 Test Date: 01/27/14 Checked By: jdt

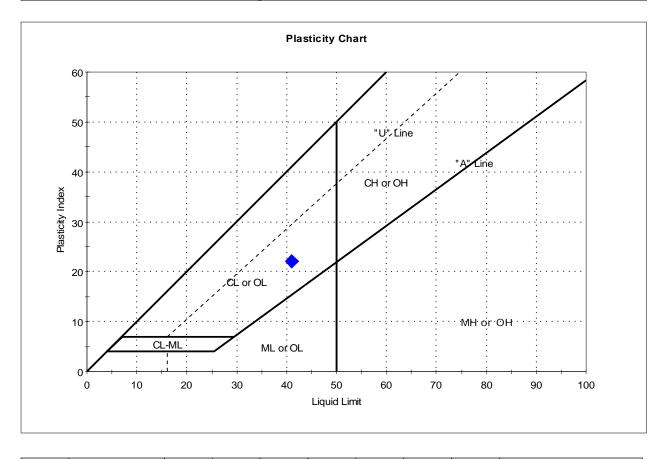
Depth: 39-41 ft Test Id: 287497

Test Comment: ---

Sample Description: Moist, light brownish gray clay

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbo	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-9	B-36	39-41 ft	31	41	19	22	1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW Toughness: LOW

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Client: AECOM
Project: Silverline
Location: Chelsea, MA
Project No: GTX-301232

Boring ID: B-42 Sample Type: jar Tested By: cam
Sample ID: SPT-9 Test Date: 12/20/13 Checked By: jdt

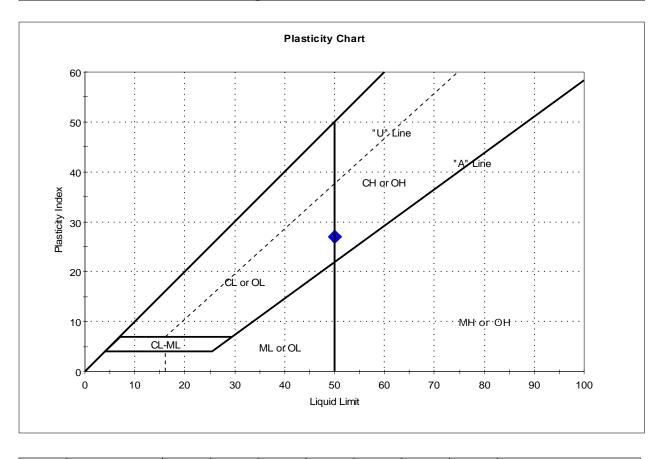
Depth: 39-41 ft Test Id: 285452

Test Comment: ---

Sample Description: Moist, dark olive gray clay

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbo	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-9	B-42	39-41 ft	38	50	23	27	1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW Toughness: LOW

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Client: AECOM
Project: Silverline
Location: Chelsea, MA
Project No: GTX-301232

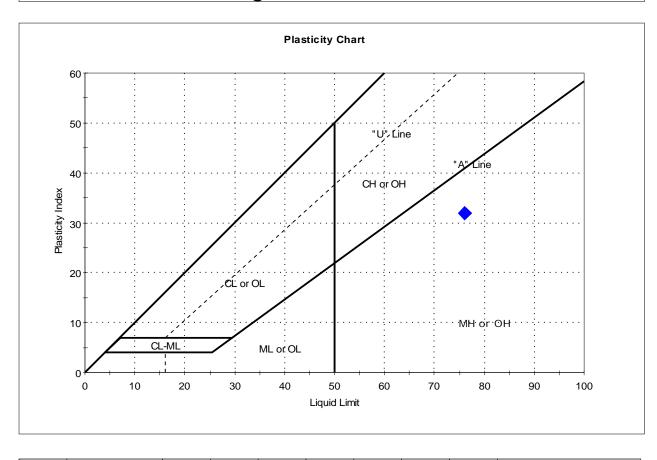
Boring ID: B-44 Sample Type: jar Tested By: cam Sample ID: SPT-1 Test Date: 01/28/14 Checked By: jdt

Depth: 6-8 ft Test Id: 287519

Test Comment: ---

Sample Description: Moist, yellowish brown silty, clayey sand with gravel Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbo	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-1	B-44	6-8 ft	44	76	44	32	0	Silty, clayey sand with gravel (SC-SM)

Sample Prepared using the WET method

66% Retained on #40 Sieve

Dry Strength: HIGH Dilatancy: SLOW Toughness: LOW

Due to a high organic content an Oven Dried Liquid Limit was performed.

The Oven Dried Liquid Limit was determined to be non-plastic.



Client: AECOM
Project: Silverline
Location: Chelsea, MA
Project No: GTX-301232

Boring ID: B-47 Sample Type: tube Tested By: cam Sample ID: OT-1 Test Date: 01/09/14 Checked By: jdt

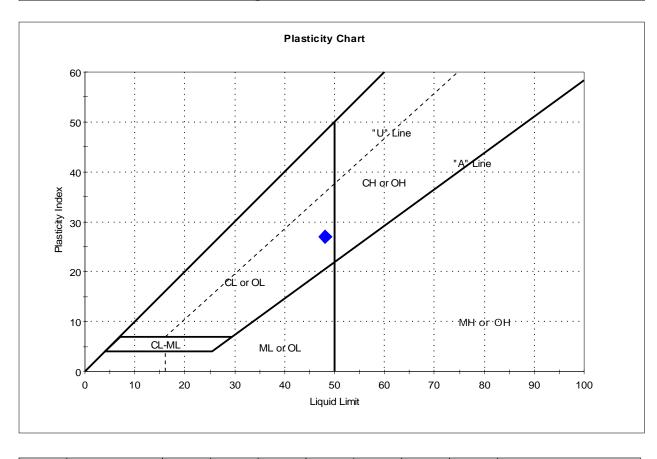
Depth: 24-26 ft Test Id: 286851

Test Comment: --

Sample Description: Moist, olive clay

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbo	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	OT-1	B-47	24-26 ft	34	48	21	27	0	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW Toughness: LOW

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Client: AECOM
Project: Silverline
Location: Chelsea, MA
Project No: GTX-301232

Boring ID: B-47 Sample Type: tube Tested By: cam Sample ID: OT-7 Test Date: 01/09/14 Checked By: jdt

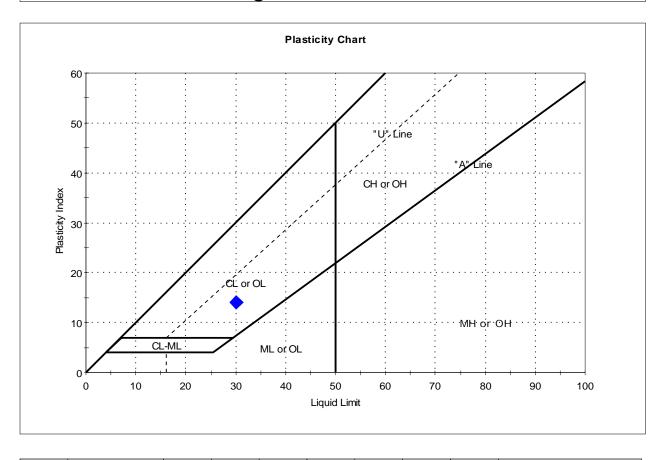
Depth: 59-61 ft Test Id: 286852

Test Comment: ---

Sample Description: Moist, olive gray clay

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	OT-7	B-47	59-61 ft	31	30	16	14	1	

Sample Prepared using the WET method

Dry Strength: HIGH Dilatancy: SLOW Toughness: LOW



Client: AECOM
Project: Silverline
Location: Chelsea, MA
Project No: GTX-301232

Boring ID: B-50 Sample Type: jar Tested By: cam Sample ID: SPT-2 Test Date: 01/27/14 Checked By: jdt

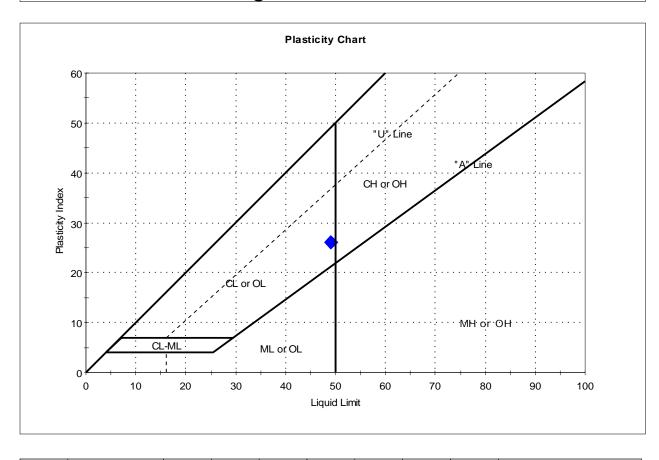
Depth: 14-16 ft Test Id: 287499

Test Comment: ---

Sample Description: Moist, light brownish gray clay

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-2	B-50	14-16 ft	34	49	23	26	0	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW Toughness: LOW

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Client: AECOM
Project: Silverline
Location: Chelsea, MA
Project No: GTX-301232

Boring ID: B-50 Sample Type: jar Tested By: cam Sample ID: SPT-6 Test Date: 01/27/14 Checked By: jdt

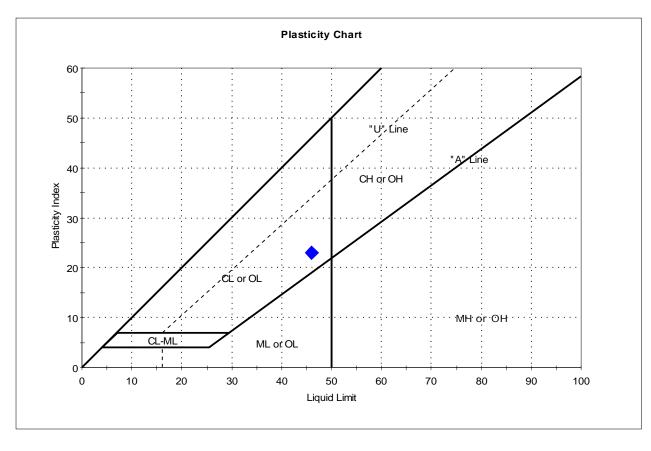
Depth: 39-41 ft Test Id: 287498

Test Comment: ---

Sample Description: Moist, light brownish gray clay

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-6	B-50	39-41 ft	39	46	23	23	1	

Sample Prepared using the WET method

Dry Strength: VERY HIGH

Dilatancy: SLOW Toughness: LOW

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Client: AECOM
Project: Silverline
Location: Chelsea, MA
Project No: GTX-301232

Boring ID: B-52 Sample Type: jar Tested By: cam Sample ID: SPT-1 Test Date: 01/30/14 Checked By: jdt

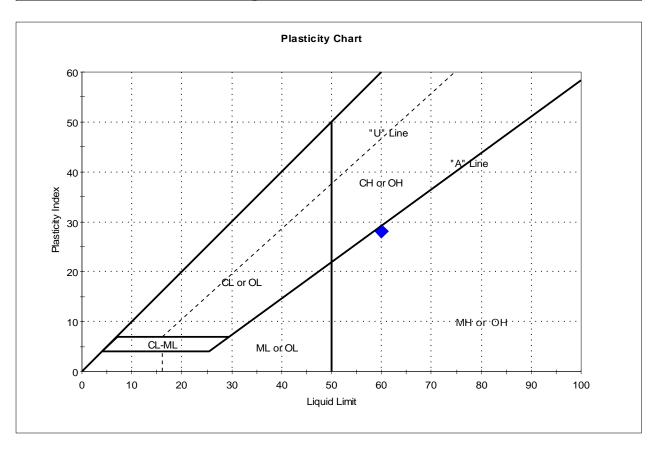
Depth: 6-8 ft Test Id: 287518

Test Comment: ---

Sample Description: Wet, very dark brown sandy silt

Sample Comment: ---

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-1	B-52	6-8 ft	65	60	32	28	1	Sandy elastic silt (MH)

Sample Prepared using the WET method

31% Retained on #40 Sieve

Dry Strength: HIGH Dilatancy: SLOW Toughness: LOW

Due to a high organic content an Oven Dried Liquid Limit was performed.

The Oven Dried Liquid Limit was 47



Client: AECOM
Project: Silverline
Location: Chelsea, MA Project No:

Boring ID: B-59 Sample Type: jar Tested By: cam Sample ID: SPT-2 Test Date: 01/30/14 Checked By: jdt

GTX-301232

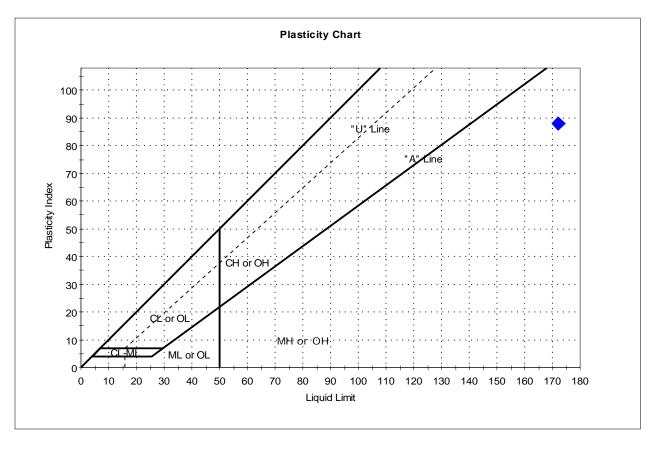
Depth: 10-12 ft Test Id: 287520

Test Comment: ---

Sample Description: Moist, very dark brown sandy silt

Sample Comment: --

Atterberg Limits - ASTM D4318



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
•	SPT-2	B-59	10-12 ft	167	172	85	87	1	Sandy organic silt (OH)

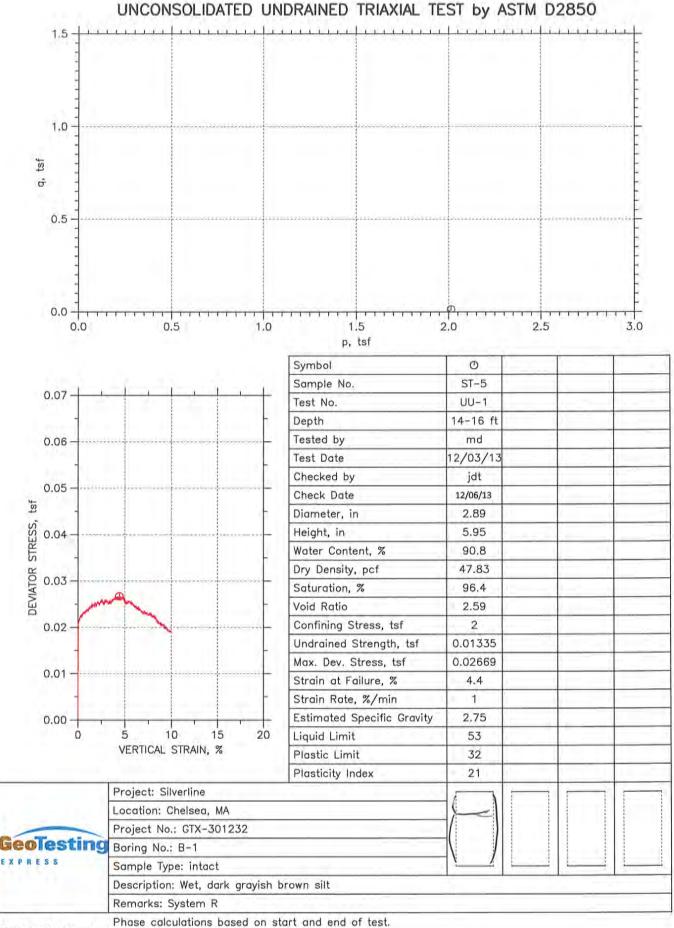
Sample Prepared using the WET method

17% Retained on #40 Sieve Dry Strength: VERY HIGH

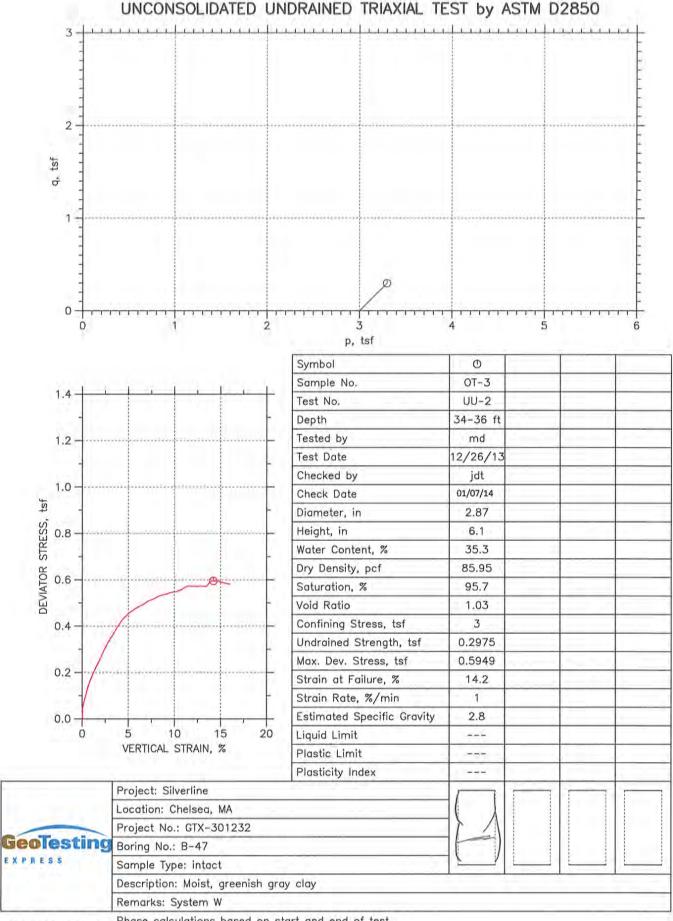
Dilatancy: SLOW Toughness: LOW

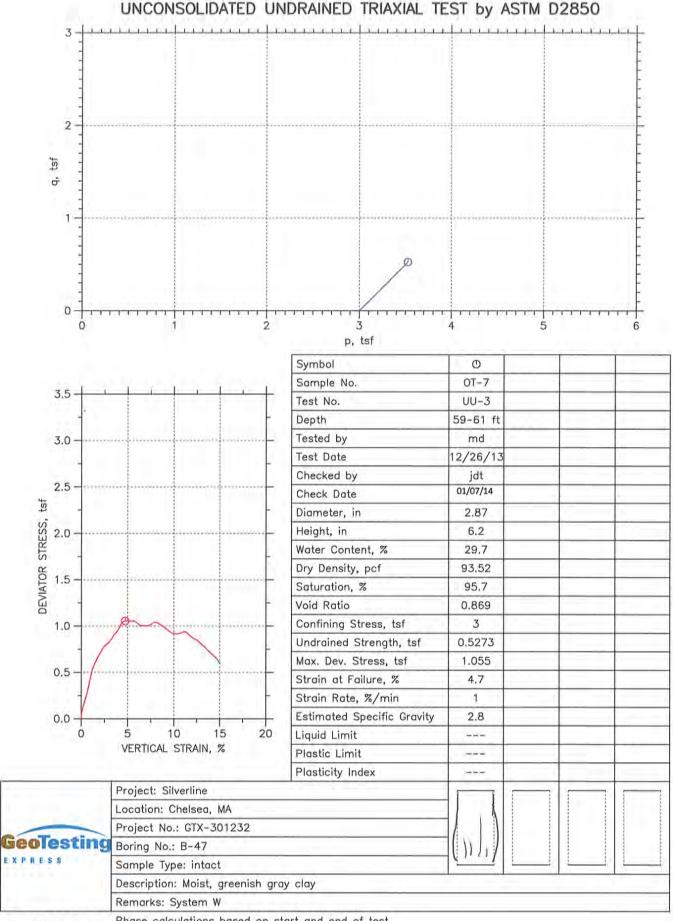
Due to a high organic content an Oven Dried Liquid Limit was performed.

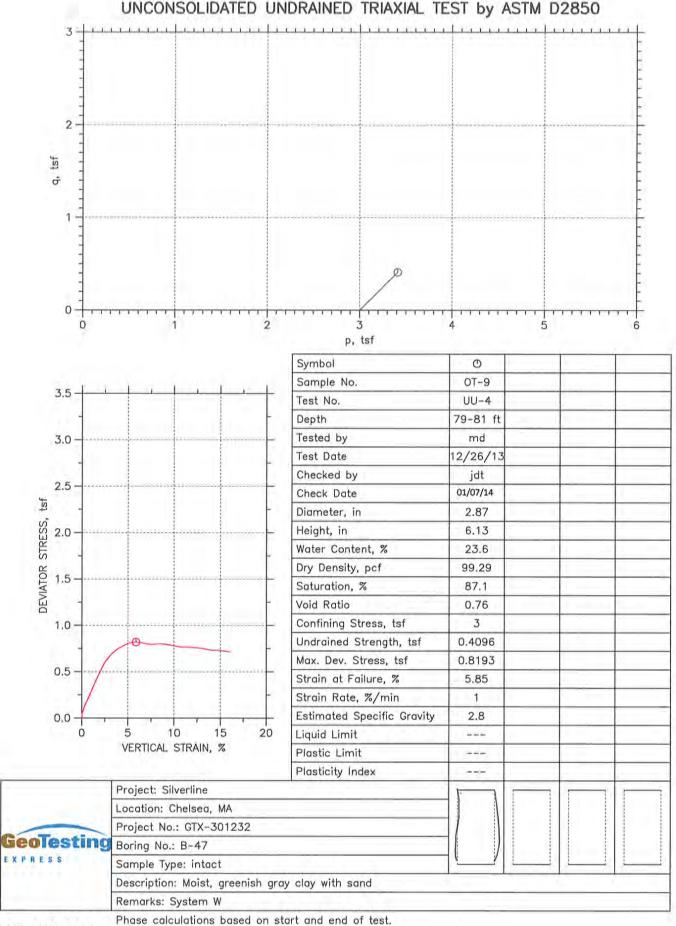
The Oven Dried Liquid Limit was 85



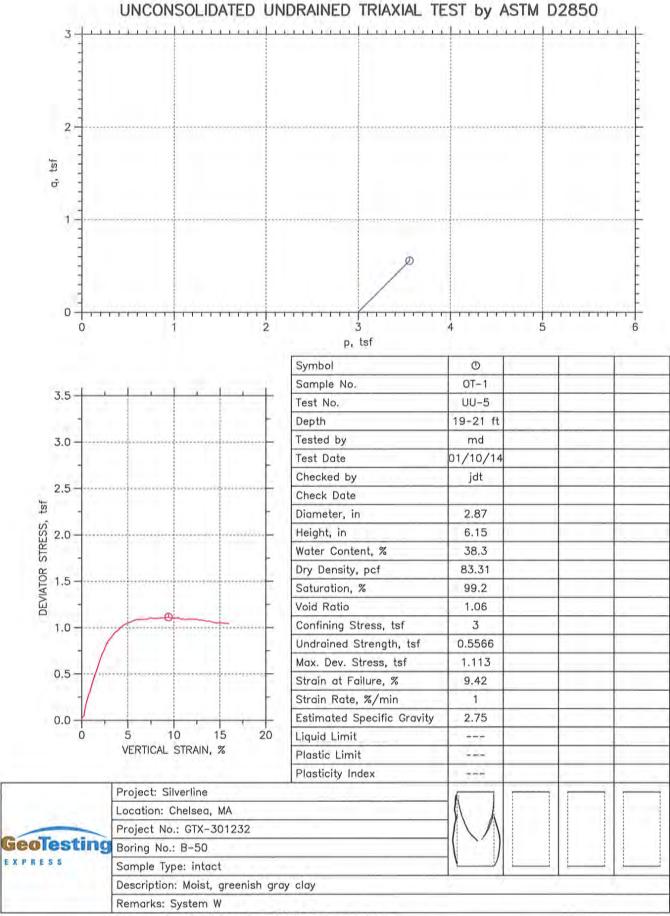
Fri, 06-DEC-2013 12:22:56

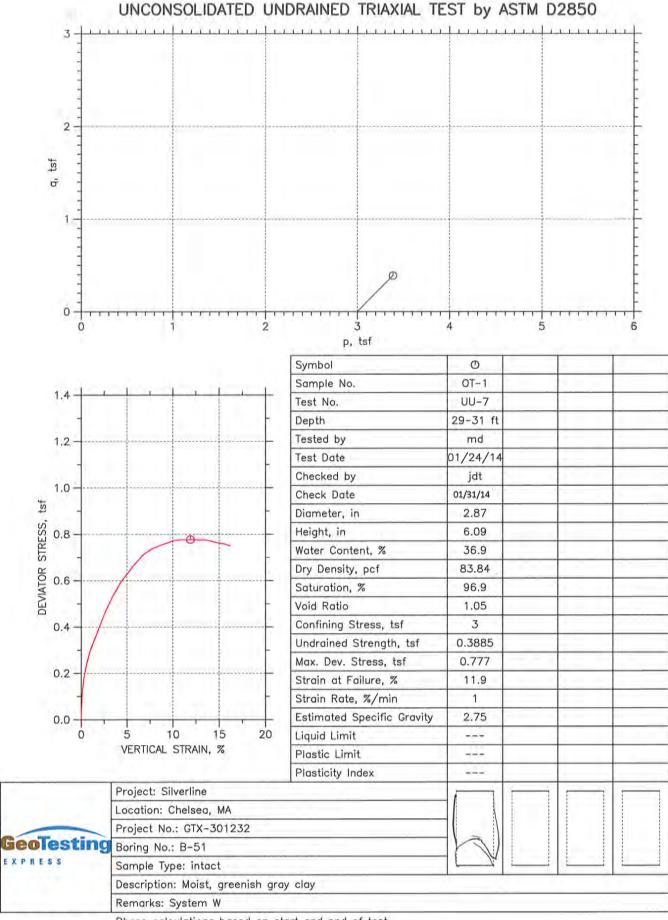


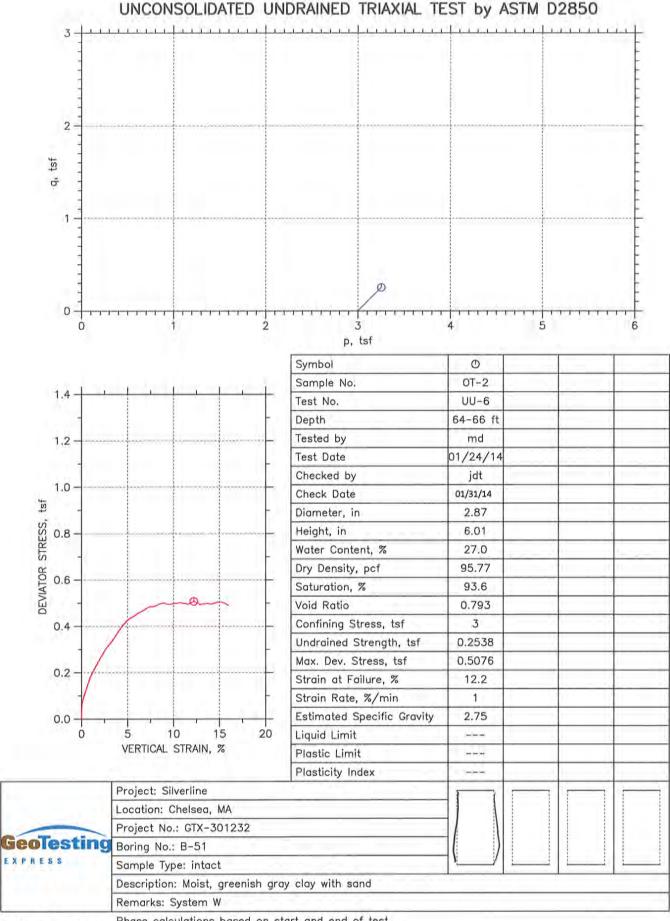




Fri, 27-DEC-2013 12:12:04





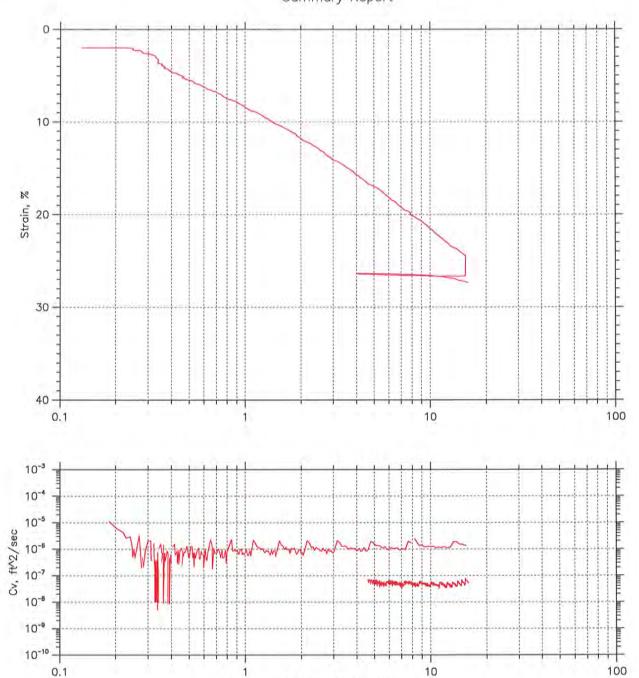


Thu, 30-JAN-2014 13:44:00



Constant Rate of Consolidation

Constant Strain Rate by ASTM D4186 Summary Report



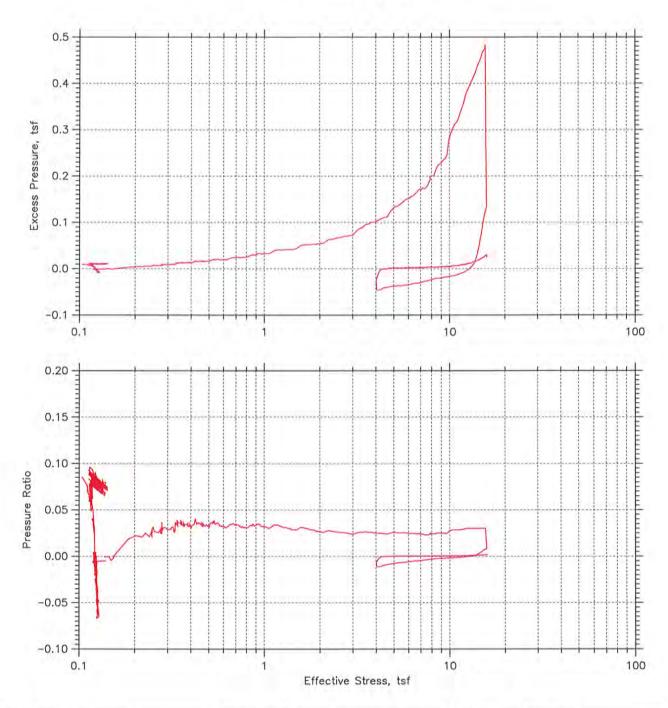
Remarks: System S		
Description: Moist, dark grayi	sh brown silt	
Test No.: CRS-1	Sample Type: intact	Elevation:
Sample No.: ST-5	Test Date: 11/26/13	Depth: 14-16 ft
Boring No.: B-1	Tested By: md	Checked By: jdt
Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232

Effective Stress, tsf



Constant Rate of Consolidation

Constant Strain Rate by ASTM D4186
Pressure Curves



Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
Boring No.: B-1	Tested By: md	Checked By: jdt
Sample No.: ST-5	Test Date: 11/26/13	Depth: 14-16 ft
Test No.: CRS-1	Sample Type: intact	Elevation:
Description: Moist, dark grayis	h brown silt	
Remarks: System S		

GeoTesting

Project: Silverline Boring No.: B-1 Sample No.: ST-5 Test No.: CRS-1

CRC TEST DATA

Location: Chelsea, MA Tested By: md Test Date: 11/26/13 Sample Type: intact

Project No.: GTX-301232 Checked By: jdt Depth: 14-16 ft Elevation: ---

Soil Description: Moist, dark grayish brown silt Remarks: System S

Estimated Specific Gravity: 2.76 Initial Void Ratio: 1.40 Final Void Ratio: 0.779

Liquid Limit: 53 Plastic Limit: 32 Plasticity Index: 21

Specimen Diameter: 2.50 in Initial Height: 1.00 in Final Height: 0.74 in

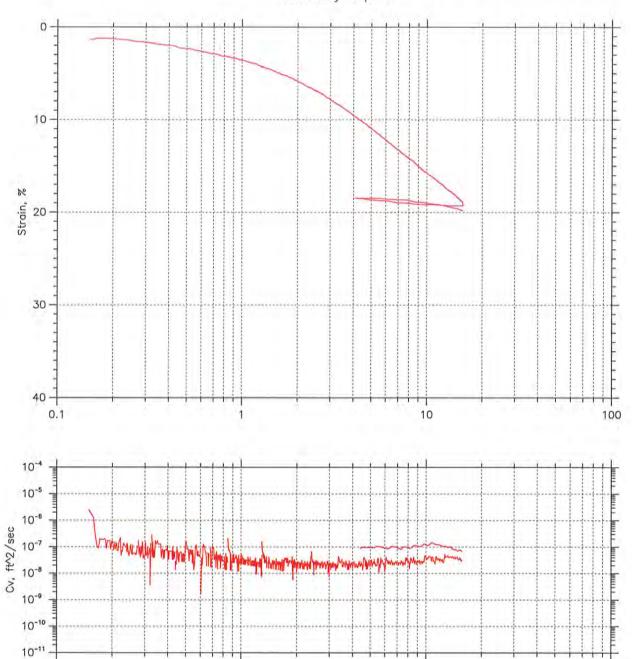
	Before Co	onsolidation Specimen+Ring	After Conso: Specimen+Ring	lidation Trimmings
Container ID	12921	RING	3	11040
Wt. Container + Wet Soil, gm Wt. Container + Dry Soil, gm Wt. Container, gm Wt. Dry Soil, gm Water Content, % Void Ratio Degree of Saturation, % Dry Unit Weight, pcf	141.94 95.790 8.2200 87.570 52.70	248.20 201.78 109.60 92.185 50.35 1.40 98.80 71.543	227.85 201.78 109.60 92.185 28.27 0.779 100.00 96.680	126.90 100.63 7.7200 92.910 28.27

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.



Constant Rate of Consolidation

Constant Strain Rate by ASTM D4186 Summary Report



Project: Silver Line	Location: Chelsea, MA	Project No.: GTX-301232
Boring No.: B-47	Tested By: md	Checked By: jdt
Sample No.: OT-5	Test Date: 12/19/13	Depth: 44-46 ft
Test No.: CRC-2	Sample Type: intact	Elevation:
Description: Moist, greenish gr	ay clay	*
Remarks: System K	7	

Effective Stress, tsf

10

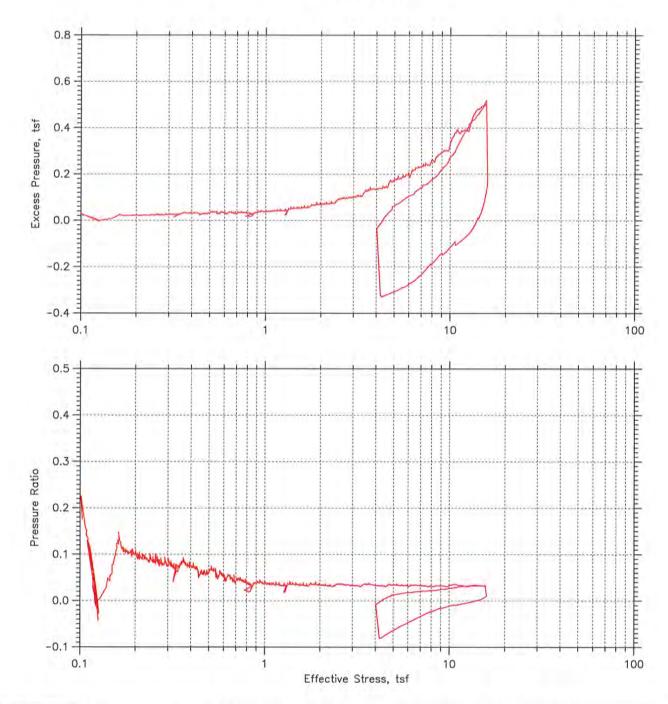
100

0.1



Constant Rate of Consolidation

Constant Strain Rate by ASTM D4186 Pressure Curves



Project: Silver Line	Location: Chelsea, MA	Project No.: GTX-301232
Boring No.: B-47	Tested By: md	Checked By: jdt
Sample No.: OT-5	Test Date: 12/19/13	Depth: 44-46 ft
Test No.: CRC-2	Sample Type: intact	Elevation:
Description: Moist, greenish gr	ay clay	***************************************
Remarks: System K		

GeoTesting

CRC TEST DATA

Project: Silver Line Boring No.: B-47 Sample No.: OT-5 Test No.: CRC-2

Location: Chelsea, MA Tested By: md Test Date: 12/19/13 Sample Type: intact Project No.: GTX-301232 Checked By: jdt Depth: 44-46 ft Elevation: ---

Soil Description: Moist, greenish gray clay Remarks: System \mathbf{K}

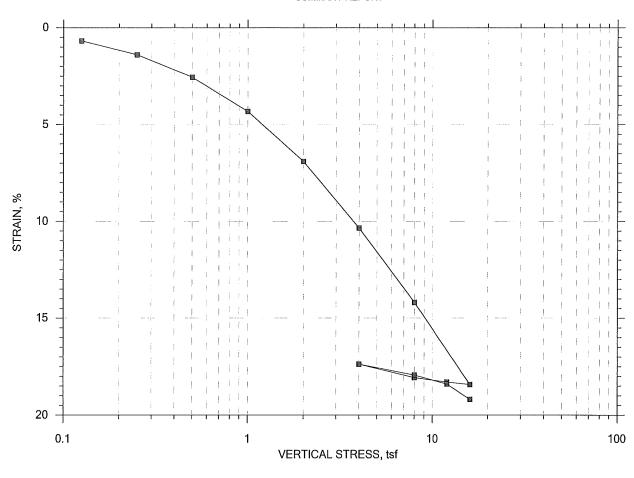
Estimated Specific Gravity: 2.79 Initial Void Ratio: 1.24 Final Void Ratio: 0.816 Liquid Limit: ---Plastic Limit: ---Plasticity Index: --- Specimen Diameter: 2.50 in Initial Height: 1.00 in Final Height: 0.81 in

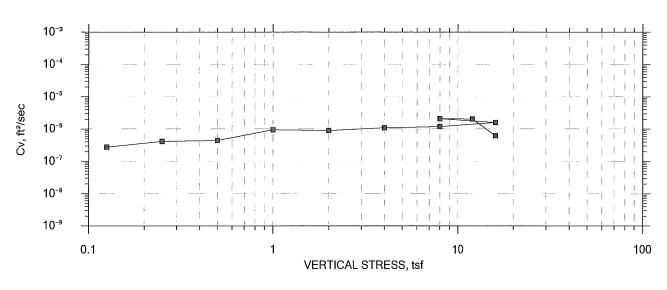
22700 4 TO 4700 BY 17 17 17 18			A CONTRACT OF THE PARTY OF THE	
	Before Co Trimmings	onsolidation Specimen+Ring	After Conso Specimen+Ring	lidation Trimmings
Container ID	13452	RING		13234
Wt. Container + Wet Soil, gm Wt. Container + Dry Soil, gm Wt. Container, gm Wt. Dry Soil, gm Water Content, % Void Ratio Degree of Saturation, % Dry Unit Weight, pcf	223.81 155.19 8.2900 146.90 46.71	354.98 311.13 211.07 100.06 43.83 1.24 98.42	340.40 311.13 211.07 100.06 29.26 0.816 100.00 95.868	138.49 109.03 8.3300 100.70 29.26

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT

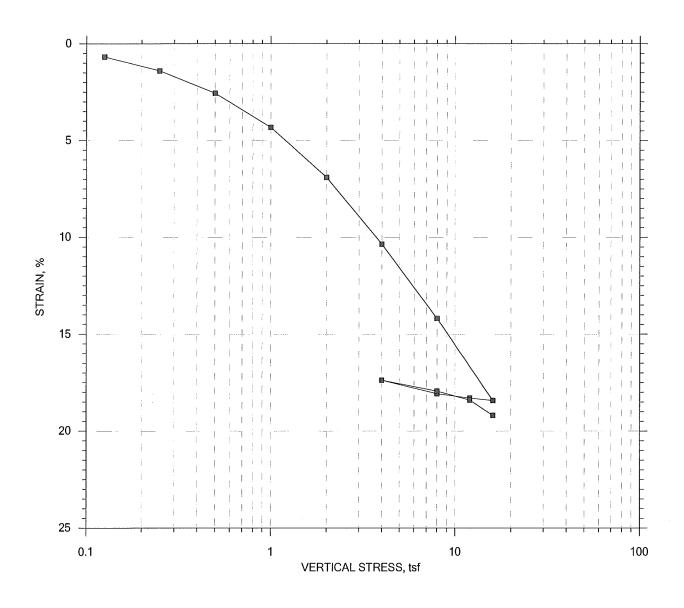




	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232				
	Boring No.: B-47	Tested By: md	Checked By: jdt				
Callantina	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1				
Geolesting	Depth: 24-26 ft	Sample Type: intact	Elevation:				
EAPRESS	Description: Moist, greenish gray clay						
	Remarks: System Q						
	Displacement at End of Increment						

One-Dimensional Consolidation by ASTM D2435 - Method B

SUMMARY REPORT



					Before Test	After Test
Current Vertical Effective Stress:			Water Content, %	37.88	23.57	
Preconsolidation Stress:			Dry Unit Weight, pcf	84.099	105.12	
Compression Ratio:			Saturation, %	98.61	100.00	
Diameter: 2.5 in Height: 1 in		Void Ratio	1.07	0.66		
LL:	PL:	Pl:	GS: 2.79			

	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
Costonia	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1		
GeoTesting	Depth: 24-26 ft	Sample Type: intact	Elevation:		
EXPRESS	Description: Moist, greenish gray clay				
	Remarks: System Q				
	Displacement at End of Increment				

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Silverline Boring No.: B-47 Sample No.: OT-1 Test No.: IP-1

Location: Chelsea, MA Tested By: md Test Date: 12/19/13 Sample Type: intact Project No.: GTX-301232 Checked By: jdt Depth: 24-26 ft Elevation: ---

Soil Description: Moist, greenish gray clay

Remarks: System Q

Estimated Specific Gravity: 2.79 Liquid Limit: --Initial Void Ratio: 1.07 Plastic Limit: --Final Void Ratio: 0.658 Plasticity Index: ---

Specimen Diameter: 2.50 in Initial Height: 1.00 in Final Height: 0.80 in

	Before Co	onsolidation	After Consol	lidation
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	13470	RING		12809
Wt. Container + Wet Soil, gm	264.77	258.50	242.99	143.69
Wt. Container + Dry Soil, gm	192.91	217.45	217.45	117.85
Wt. Container, gm	8.1300	109.09	109.09	8.2000
Wt. Dry Soil, gm	184.78	108.36	108.36	109.65
Water Content, %	38.89	37.88	23.57	23.57
Void Ratio		1.07	0.658	
Degree of Saturation, %		98.61	100.00	
Dry Unit Weight, pcf	and are are	84.099	105.12	

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Silverline Boring No.: B-47 Sample No.: OT-1 Test No.: IP-1 Location: Chelsea, MA Tested By: md Test Date: 12/19/13 Sample Type: intact Project No.: GTX-301232 Checked By: jdt Depth: 24-26 ft Elevation: ---

Soil Description: Moist, greenish gray clay Remarks: System ${\tt Q}$

Displacement at End of Increment

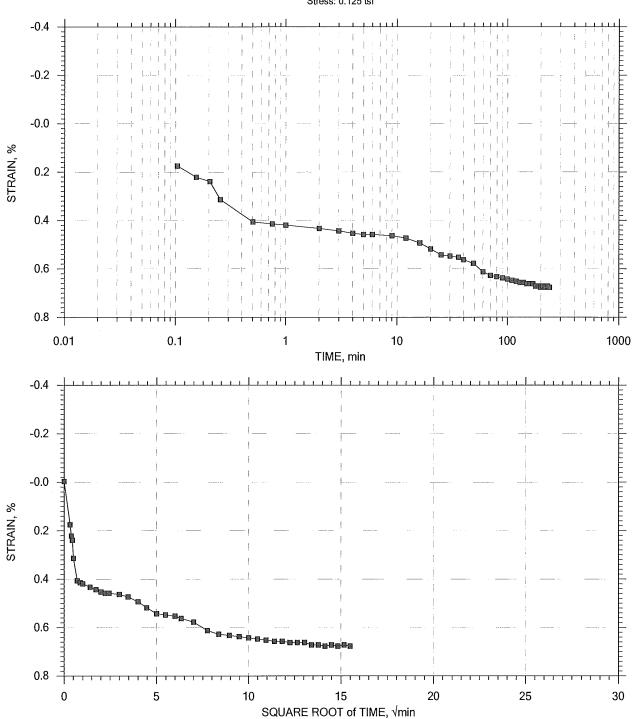
	Applied Stress	Final Displacement	Void Ratio	Strain at End	Sq.Rt T90	Cv	Mv	k	
	tsf	in		용	min	ft²/sec	1/tsf	ft/day	
1	0.125	0.006768	1.06	0.677	97.579	2.50e-007	5.41e-002	3.65e-005	
2	0.250	0.01398	1.04	1.40	65.062	3.69e-007	5.77e-002	5.75e-005	
3	0.500	0.02553	1.02	2.55	44.918	5.25e-007	4.62e-002	6.54e-005	
4	1.00	0.04319	0.983	4.32	25.996	8.80e-007	3.53e-002	8.39e-005	
5	2.00	0.06901	0.929	6.90	24.635	8.87e-007	2.58e-002	6.18e-005	
6	4.00	0.1034	0.858	10.3	16.047	1.28e-006	1.72e-002	5.93e-005	
7	8.00	0.1418	0.779	14.2	14.461	1.31e~006	9.59e-003	3.38e-005	
8	16.0	0.1842	0.691	18.4	10,233	1.68e-006	5.29e-003	2.40e-005	
9	12.0	0.1829	0.693	18.3	1.963	8.33e-006	3.10e-004	6.97e-006	
10	8.00	0.1807	0.698	18.1	5.527	2.97e-006	5.60e-004	4.49e-006	
11	4.00	0.1737	0.712	17.4	9.878	1.68e-006	1.74e-003	7.90e-006	
12	8.00	0.1793	0.701	17.9	8.604	1.93e-006	1.40e-003	7.33e-006	
13	12.0	0.1840	0.691	18.4	10.089	1.63e-006	1.16e-003	5.11e-006	
14	16.0	0.1918	0.675	19.2	26.987	6.00e-007	1.96e-003	3.17e-006	
	Applied	Final	Void	Strain	Log				
	Stress	Displacement	Ratio	at End	T50	Cv	Mv	k	Ca
	tsf	in		왕	min	ft²/sec	1/tsf	ft/day	윰
1	0.125	0.006768	1.06	0.677	0.000	0.00e+000	5.41e-002	0.00e+000	0.00e+000
2	0.250	0.01398	1.04	1.40	0.000	0.00e+000	5.77e-002	0.00e+000	0.00e+000
2	0.500	0.02553	1.02	2.55	12.504	4.38e-007	4.62e-002	5.45e-005	0.00e+000
4	1.00	0.04319	0.983	4.32	0.000	0.00e+000	3.53e-002	0.00e+000	0.00e+000
5 6	2.00	0.06901	0,929	6.90	0.000	0.00e+000	2.58e-002	0.00e+000	0.00e+000
6	4.00	0.1034	0,858	10.3	4.852	9.81e-007	1.72e-002	4.55e-005	0.00e+000
7	8.00	0.1418	0.779	14.2	4.090	1.07e-006	9.59e-003	2.77e-005	0.00e+000
8	16.0	0.1842	0.691	18.4	2.661	1.50e-006	5.29e-003	2.14e-005	0.00e+000
9	12.0	0.1829	0.693	18.3	0.000	0.00e+000	3.10e-004	0.00e+000	0.00e+000
10	8.00	0.1807	0.698	18.1	0.000	0.00e+000	5.60e-004	0.00e+000	0.00e+000
11	4.00	0.1737	0.712	17.4	1.712	2.25e-006	1.74e-003	1.06e-005	0.00e+000
12	8.00	0.1793	0.701	17.9	0.000	0.00e+000	1.40e-003	0.00e+000	0.00e+000
13	12.0	0.1840	0.691	18.4	1.608	2.37e-006	1.16e-003	7.45e-006	0.00e+000
14	16.0	0.1918	0.675	19.2	0.000	0.00e+000	1.96e-003	0.00e+000	0.00e+000

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 1 of 14

Stress: 0.125 tsf



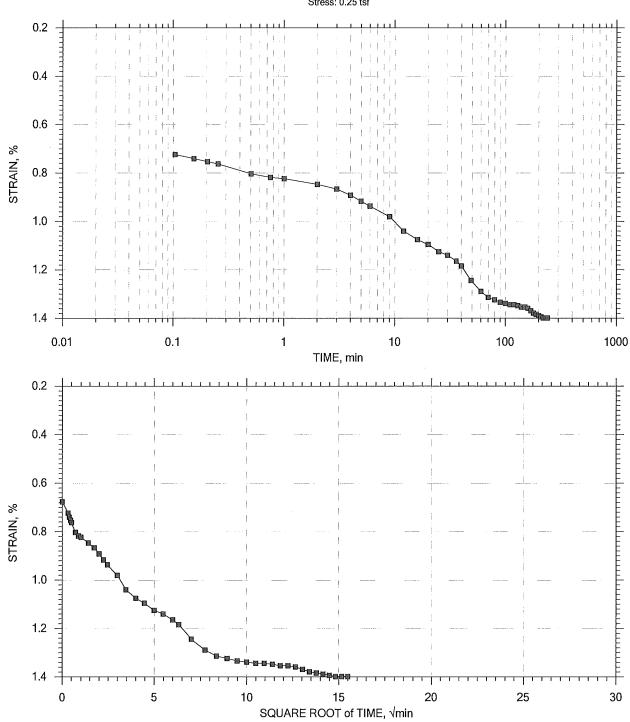
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
Castantina	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1
GeoTesting EXPRESS	Depth: 24-26 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System Q		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 14

Stress: 0.25 tsf



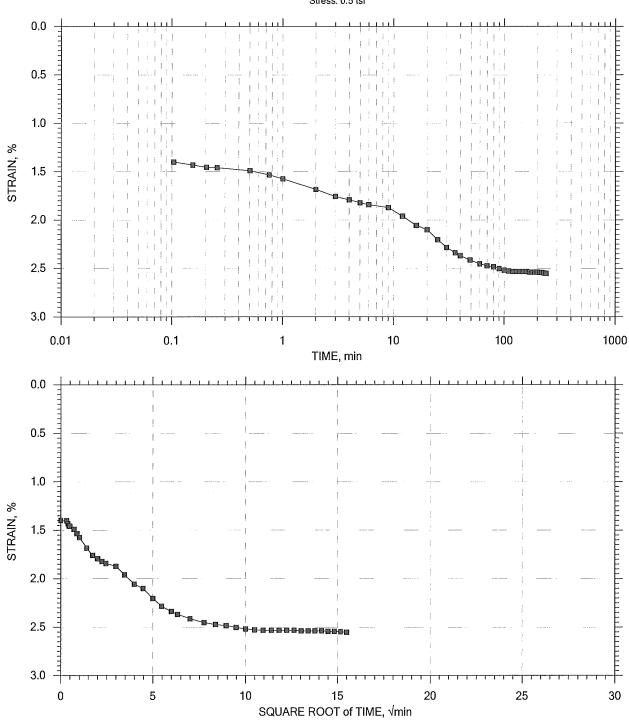
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
Callantina	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1		
GeoTesting EXPRESS	Depth: 24-26 ft	Sample Type: intact	Elevation:		
	Description: Moist, greenish gray clay				
	Remarks: System Q				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 14

Stress: 0.5 tsf

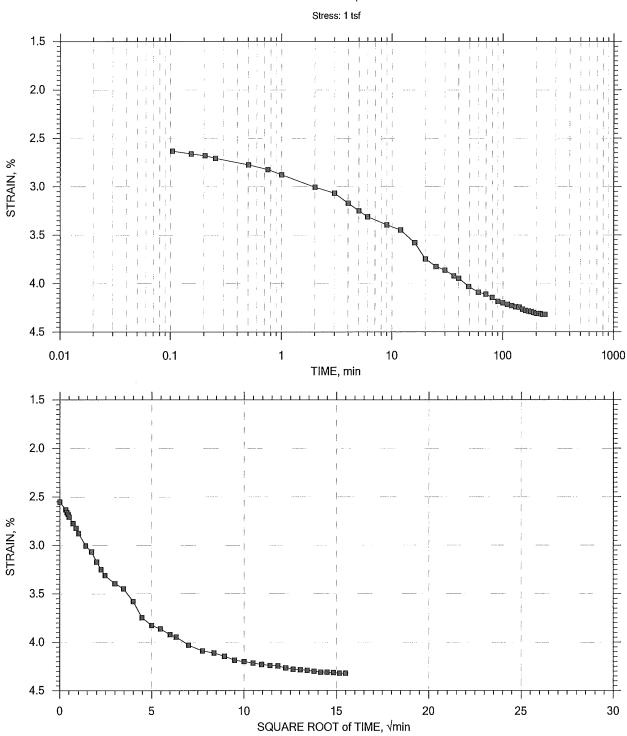


	Project: Silverline	Location: Chelsea, MA	Project No.; GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
Collection	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1		
Geolesting EXPRESS	Depth: 24-26 ft	Sample Type: intact	Elevation:		
EXPRESS	Description: Moist, greenish gray clay				
	Remarks: System Q				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 14



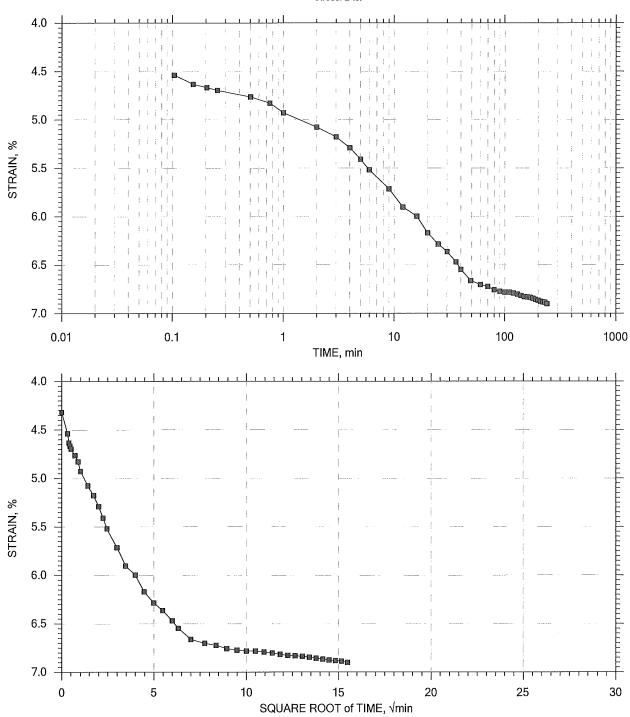
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
Castachine	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1		
Geolesting EXPRESS	Depth: 24-26 ft	Sample Type: intact	Elevation:		
EXPRESS	Description: Moist, greenish gray clay				
	Remarks: System Q				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 14





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Castantine	;
Geolesting Express	I
LAFRESS	I

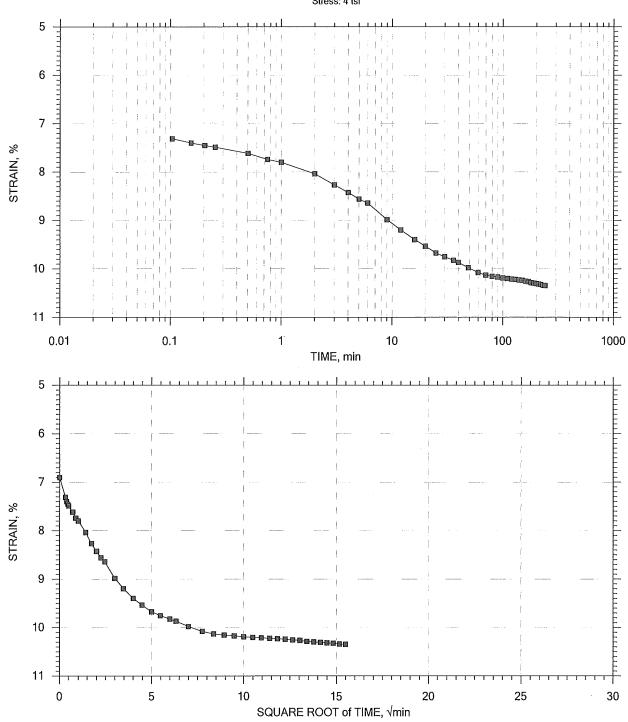
Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232			
Boring No.: B-47	Tested By: md	Checked By: jdt			
Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1			
Depth: 24-26 ft	Sample Type: intact	Elevation:			
Description: Moist, greenish gray clay					
Remarks: System Q					
	Boring No.: B-47 Sample No.: OT-1 Depth: 24-26 ft Description: Moist, greenish gray clay	Boring No.: B-47 Tested By: md Sample No.: OT-1 Test Date: 12/19/13 Depth: 24-26 ft Description: Moist, greenish gray clay			

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 14





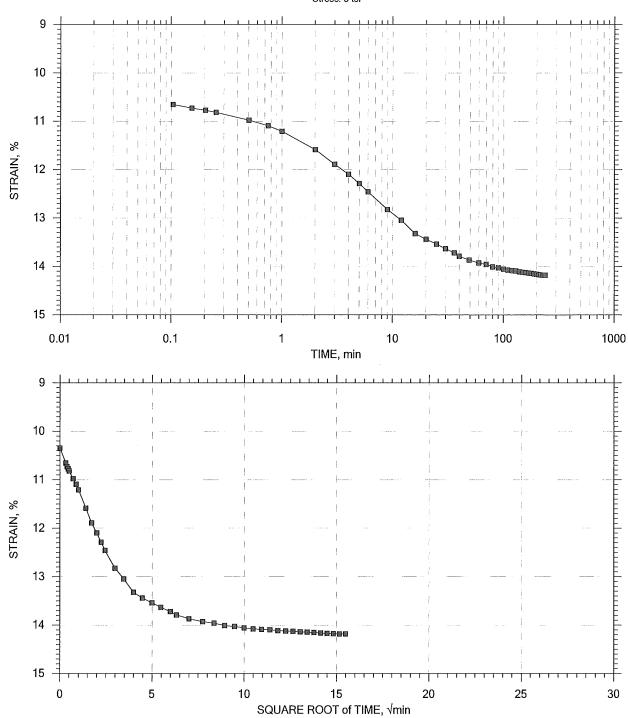
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
Collegative	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1		
GeoTesting EXPRESS	Depth: 24-26 ft	Sample Type: intact	Elevation:		
	Description: Moist, greenish gray clay				
	Remarks: System Q				
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 14





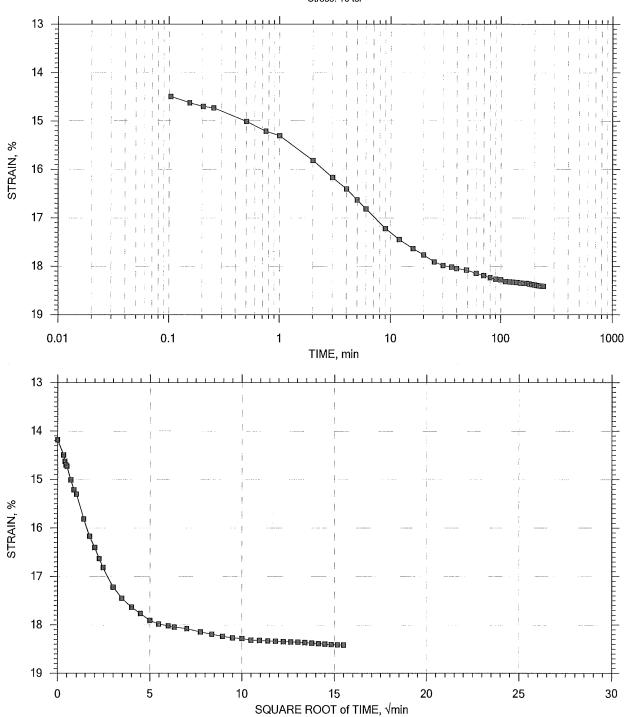
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
Collectine	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1		
Geolesting	Depth: 24-26 ft	Sample Type: intact	Elevation:		
EARRESS	Description: Moist, greenish gray clay				
	Remarks: System Q				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 14

Stress: 16 tsf



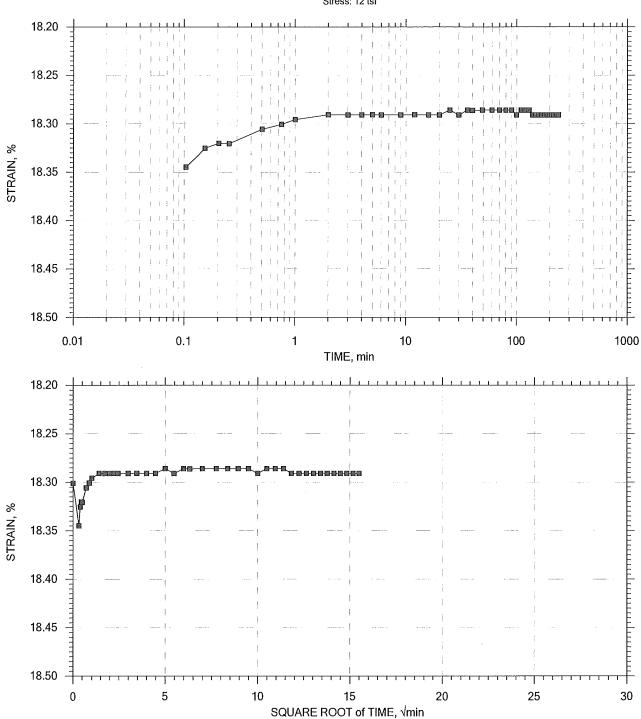
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
Callandina	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1
GeoTesting EXPRESS	Depth: 24-26 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System Q		
	,		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 14





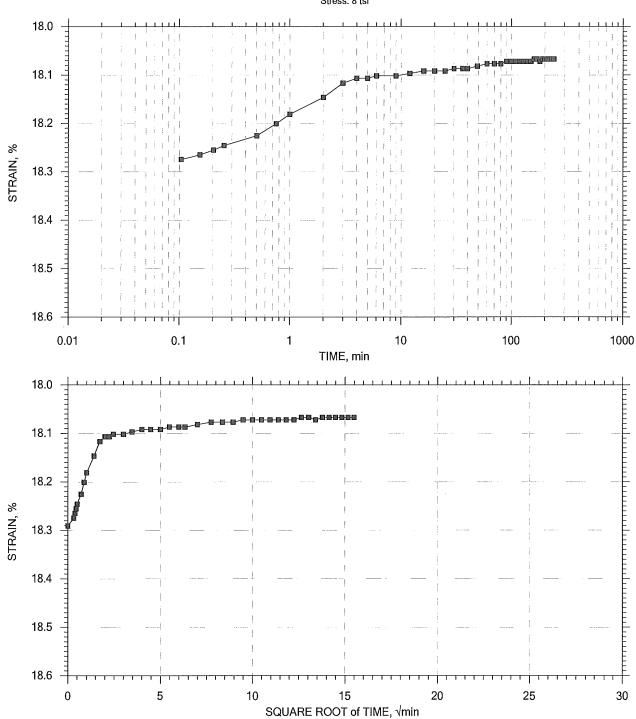
GeoTesting EXPRESS	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1
	Depth: 24-26 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System Q		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 14





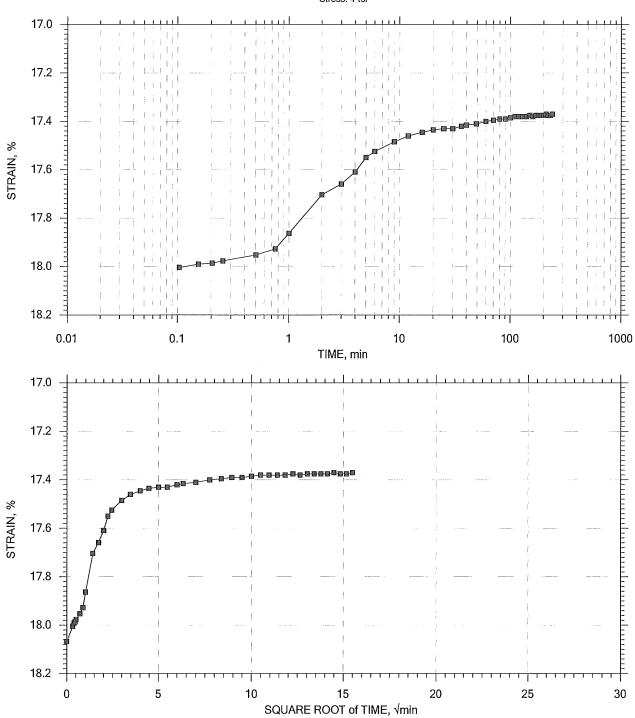
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
Goston	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1
Geolesting EXPRESS	Depth: 24-26 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay		
	Remarks: System Q		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 14





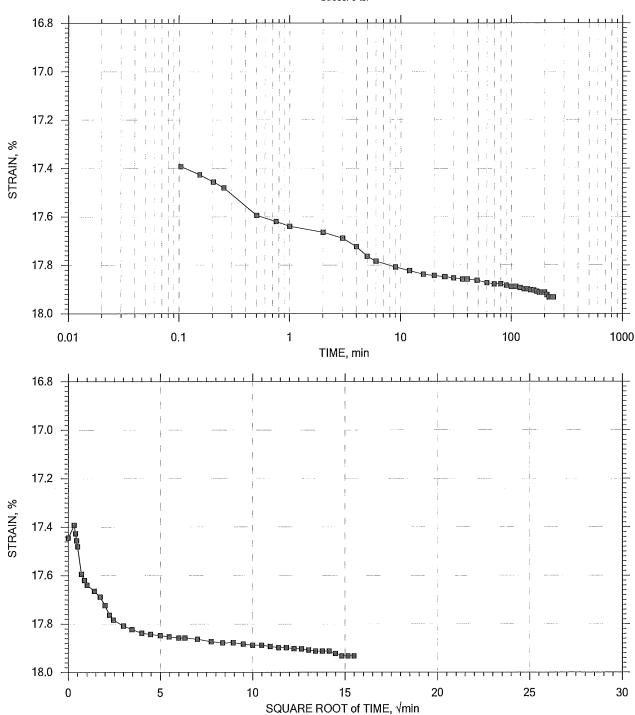
GeoTesting EXPRESS	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-47	Tested By: md	Checked By: jdt	
	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1	
	Depth: 24-26 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay			
	Remarks: System Q			

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 14





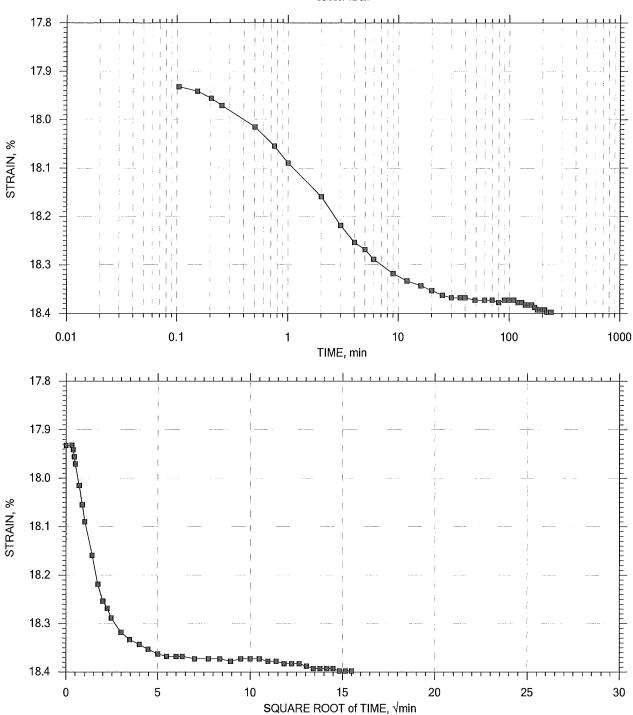
GeoTesting EXPRESS	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1
	Depth: 24-26 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System Q		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 14





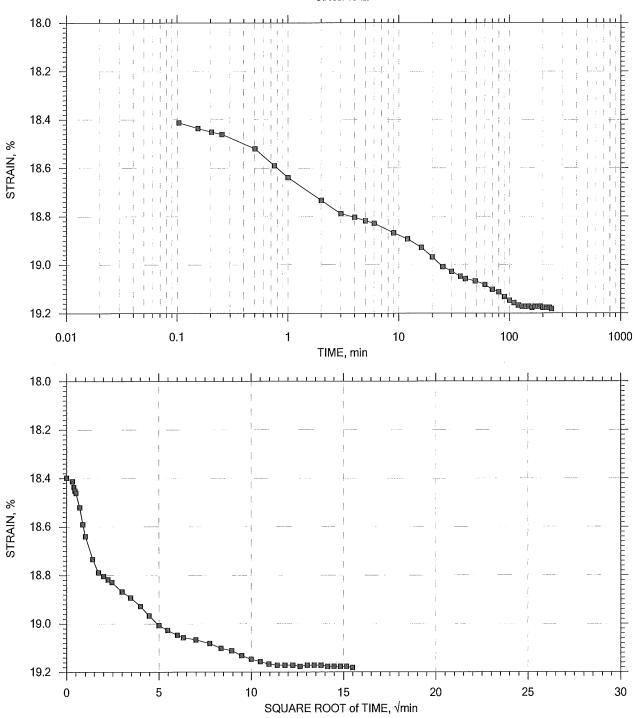
Geolesting EXPRESS	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-47	Tested By: md	Checked By: jdt	
	To other or	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1
	Depth: 24-26 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay			
	Remarks: System Q			

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

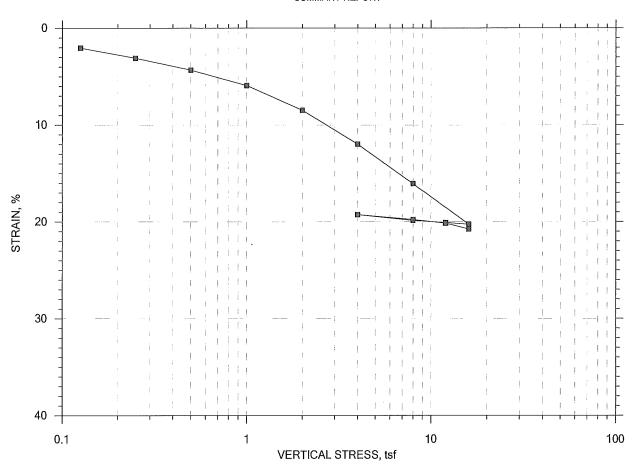
Constant Load Step 14 of 14

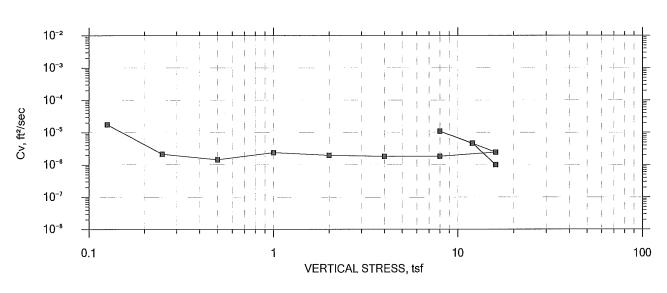
Stress: 16 tsf



	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
	Sample No.: OT-1	Test Date: 12/19/13	Test No.: IP-1
GeoTesting EXPRESS	Depth: 24-26 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System Q		

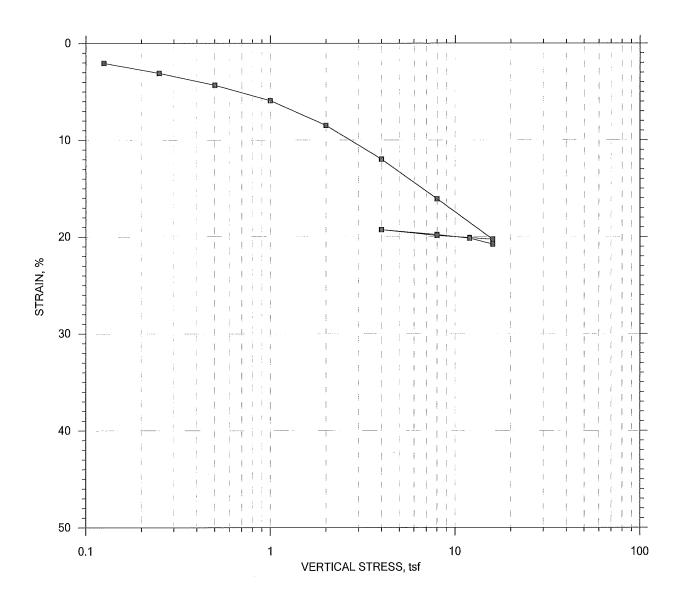
SUMMARY REPORT





	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-47	Tested By: md	Checked By: jdt	
	Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4	
Geolesting EXPRESS	Depth: 34-36 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay			
	Remarks: System Y			
	Displacement at End of Increment			

One-Dimensional Consolidation by ASTM D2435 - Method B SUMMARY REPORT



					Before Test	After Test
Current Vertical Effective Stress:			Water Content, %	37.31	23.80	
Preconsolidation Stress:			Dry Unit Weight, pcf	85.056	105.01	
Compression Ra	Compression Ratio:			Saturation, %	98.86	100.00
Diameter: 2.5 in Height: 1 in			Void Ratio	1.06	0.67	
LL:	PL:	Pi:	GS: 2.80			· · · · · · ·

	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
Cartaga	Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4		
GeoTesting EXPRESS	Depth: 34-36 ft	Sample Type: intact	Elevation:		
	Description: Moist, greenish gray clay				
	Remarks: System Y				
	Displacement at End of Increment				

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Silverline Boring No.: B-47 Sample No.: OT-3 Test No.: IP-4

Location: Chelsea, MA Tested By: md Test Date: 12/20/13 Sample Type: intact

Project No.: GTX-301232 Checked By: jdt Depth: 34-36 ft Elevation: ---

Soil Description: Moist, greenish gray clay Remarks: System ${\rm Y}$

Estimated Specific Gravity: 2.80 Initial Void Ratio: 1.06 Final Void Ratio: 0.668 Liquid Limit: --Plastic Limit: ---Plasticity Index: --- Specimen Diameter: 2.50 in Initial Height: 1.00 in Final Height: 0.81 in

	Before Co	onsolidation	After Consol	lidation
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	13446	RING		13310
Wt. Container + Wet Soil, gm	333.34	263.00	248.19	144.65
Wt. Container + Dry Soil, gm	242.94	222.11	222.11	118.44
Wt. Container, qm	8.2800	112.51	112.51	8.3100
Wt. Dry Soil, gm	234.66	109.60	109.60	110.13
Water Content, %	38.52	37.31	23.80	23.80
Void Ratio		1.06	0.668	
Degree of Saturation, %		98.86	100.00	
Dry Unit Weight, pcf		85.056	105.01	

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method $\ensuremath{\mathsf{B}}$

Project: Silverline Boring No.: B-47 Sample No.: OT-3 Test No.: IP-4

Location: Chelsea, MA Tested By: md Test Date: 12/20/13 Sample Type: intact

Project No.: GTX-301232 Checked By: jdt Depth: 34-36 ft Elevation: ---

Soil Description: Moist, greenish gray clay Remarks: System ${\bf Y}$

Displacement at End of Increment

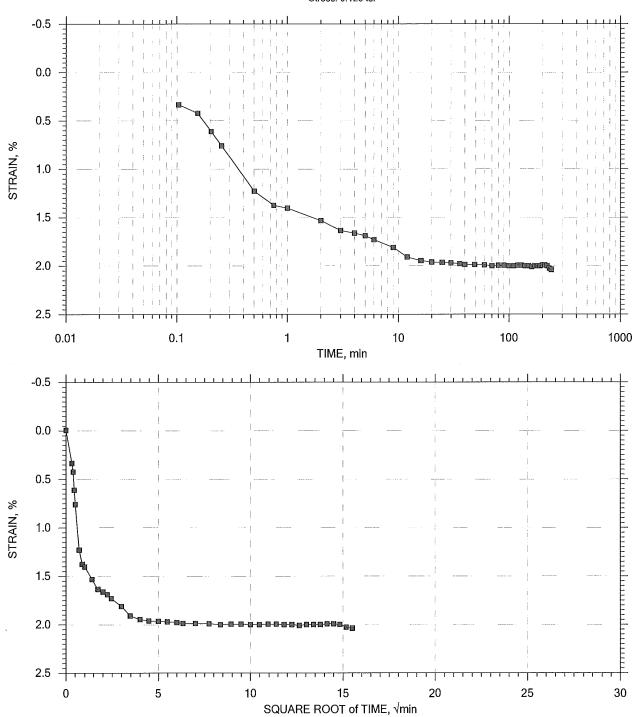
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k ft/day	
1 2 3 4 5 6 7 8 9 10 11 12 13	0.125 0.250 0.500 1.00 2.00 4.00 8.00 12.00 8.00 4.00 8.00 12.00	0.02035 0.03087 0.04325 0.05910 0.08482 0.1198 0.1607 0.2025 0.2009 0.1987 0.1926 0.1977 0.2015	1.02 0.995 0.970 0.937 0.884 0.812 0.728 0.642 0.645 0.650 0.662 0.652 0.652	2.03 3.09 4.32 5.91 8.48 12.0 16.1 20.3 20.1 19.9 19.3 19.8 20.2 20.8	1.838 11.628 11.177 10.637 10.719 9.967 10.088 5.705 0.769 0.843 2.841 2.079 4.999 17.450	1.31e-005 2.00e-006 2.04e-006 2.08e-006 1.97e-006 1.98e-006 2.88e-006 2.03e-005 1.86e-005 5.59e-006 7.65e-006 3.14e-006 8.90e-007	1.63e-001 8.42e-002 4.95e-002 3.17e-002 2.57e-002 1.75e-002 1.02e-002 5.24e-003 4.20e-004 5.49e-004 1.52e-003 1.27e-003 4.51e-003	5.74e-003 4.55e-004 2.72e-004 1.78e-004 9.37e-005 4.95e-005 2.30e-005 2.76e-005 2.28e-005 2.63e-005 8.08e-006 3.63e-006	
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k ft/day	Ca 용
1 2 3 4 5 6 7 8 9 10 11 12 13 14	0.125 0.250 0.500 1.00 2.00 4.00 8.00 12.0 8.00 4.00 8.00 12.0	0.02035 0.03087 0.04325 0.05910 0.08482 0.1198 0.1607 0.2025 0.2009 0.1987 0.1926 0.1977 0.2015	1.02 0.995 0.970 0.937 0.884 0.812 0.728 0.642 0.645 0.650 0.662 0.652 0.652	2.03 3.09 4.32 5.91 8.48 12.0 16.1 20.3 20.1 19.9 19.3 19.8 20.2 20.8	0.000 0.000 4.290 1.998 2.396 2.730 2.389 1.782 0.000 0.000 0.000 0.329 0.000	0.00e+000 0.00e+000 1.23e-006 2.57e-006 2.05e-006 1.68e-006 1.76e-006 0.00e+000 0.00e+000 0.00e+000 1.12e-005 0.00e+000 0.00e+000	1.63e-001 8.42e-002 4.95e-002 3.17e-002 2.57e-002 1.75e-002 5.24e-003 4.20e-004 5.49e-004 1.52e-003 1.27e-003 9.52e-004	0.00e+000 0.00e+000 1.64e-004 2.20e-004 1.42e-004 7.94e-005 4.85e-005 0.00e+000 0.00e+000 0.00e+000 0.85e-005 0.00e+000 0.00e+000	0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 1 of 14

Stress: 0.125 tsf

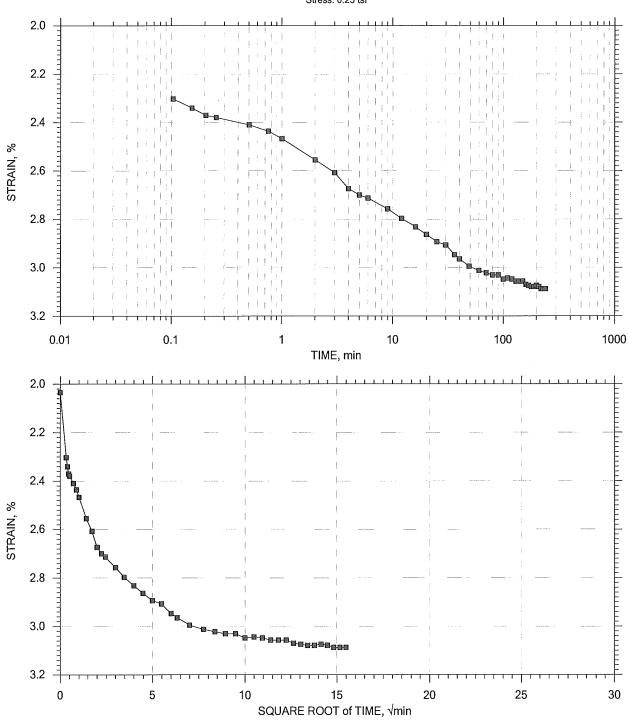


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
	Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4
GeoTesting EXPRESS	Depth: 34-36 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		-
	Remarks: System Y		

TIME CURVES

Constant Load Step 2 of 14

Stress: 0.25 tsf



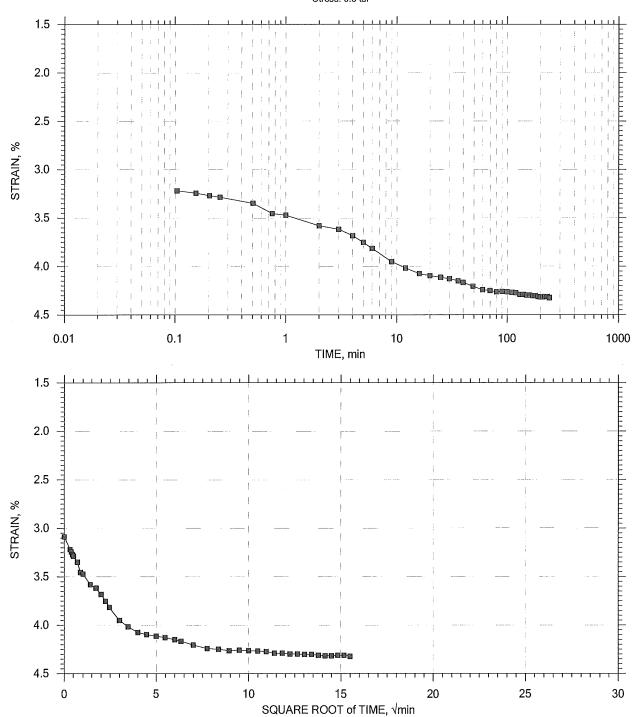
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-47	Tested By: md	Checked By: jdt	
	Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4	
Geolesting	Depth: 34-36 ft	Sample Type: intact	Elevation:	
EXPRESS	Description: Moist, greenish gray clay			
	Remarks: System Y		1	

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 14

Stress: 0.5 tsf



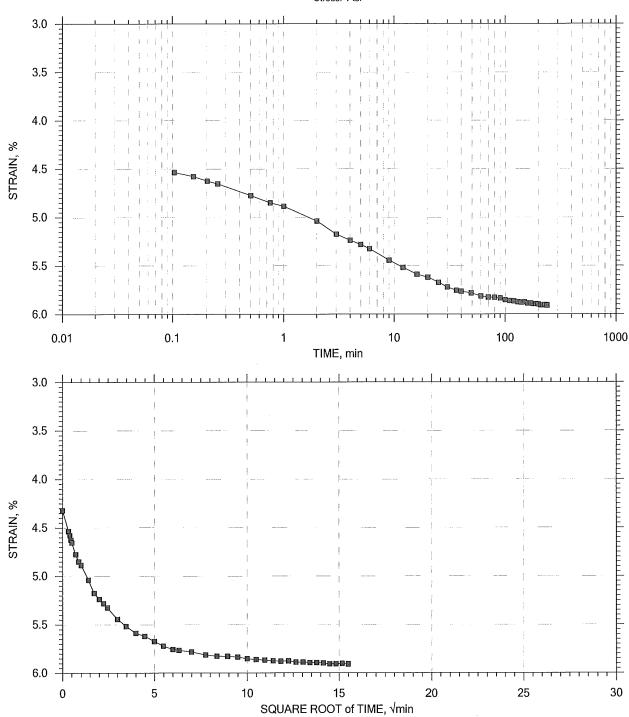
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
Castastine	Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4		
GeoTesting EXPRESS	Depth: 34-36 ft	Sample Type: intact	Elevation:		
	Description: Moist, greenish gray clay				
	Remarks: System Y				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 14





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GeoTesting	
EXPRESS	Ī

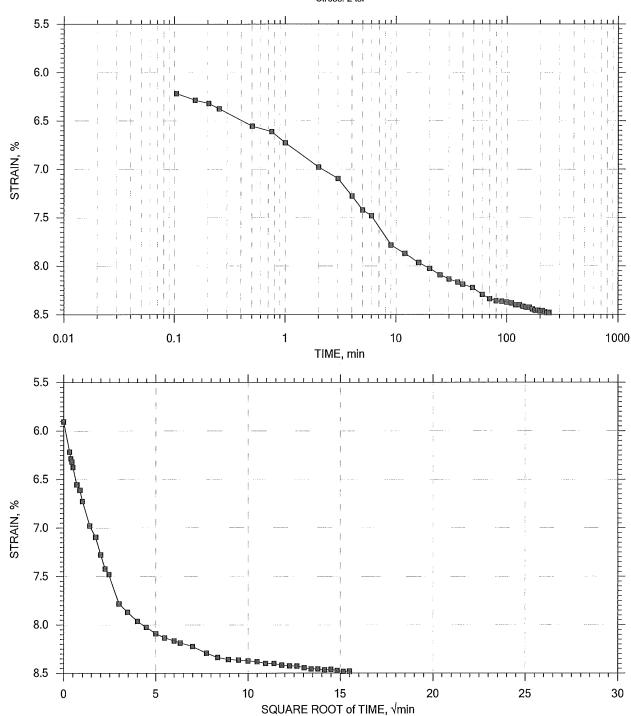
Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232			
Boring No.: B-47	Tested By: md	Checked By: jdt			
Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4			
Depth: 34-36 ft	Sample Type: intact	Elevation:			
Description: Moist, greenish gray clay	Description: Moist, greenish gray clay				
Remarks: System Y					

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 14



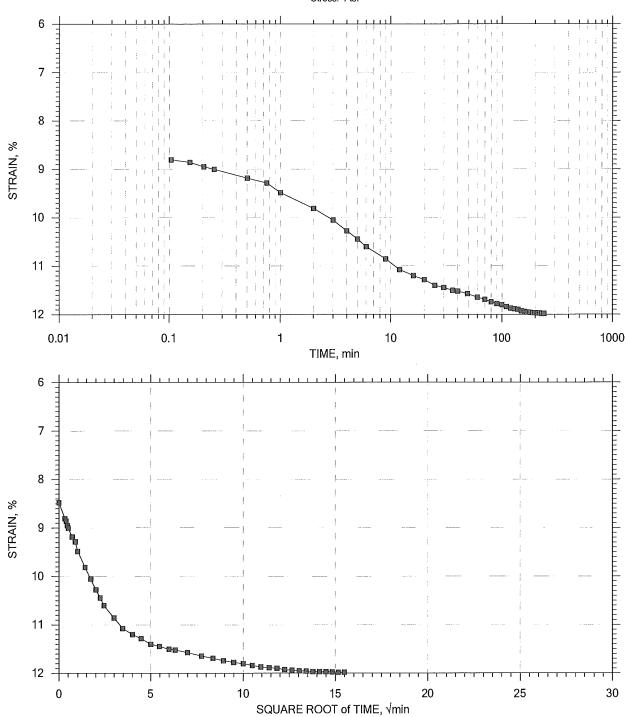


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-47	Tested By: md	Checked By: jdt	
Castantina	Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4	
Geolesting Express	Depth: 34-36 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay			
	Remarks: System Y			

TIME CURVES

Constant Load Step 6 of 14

Stress: 4 tsf

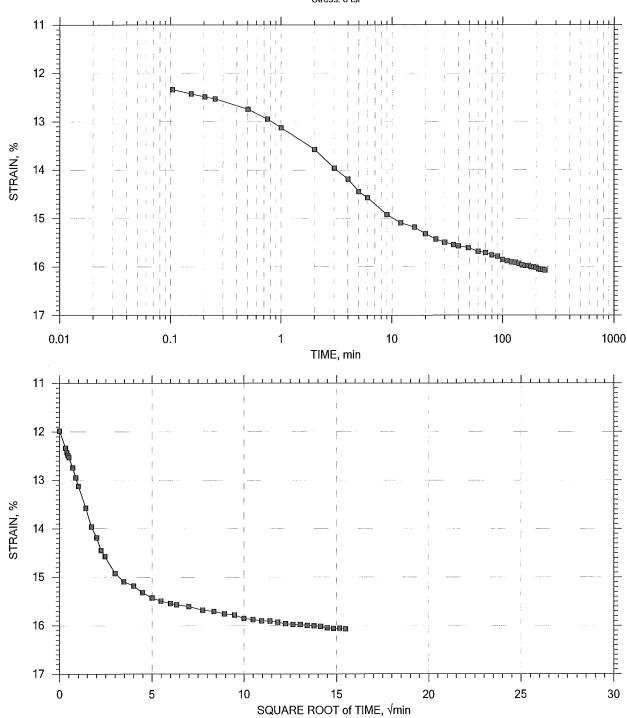


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
Castantina	Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4
GeoTesting EXPRESS	Depth: 34-36 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System Y		
		1 11 10 10 10 10 10 10 10 10 10 10 10 10	

TIME CURVES

Constant Load Step 7 of 14



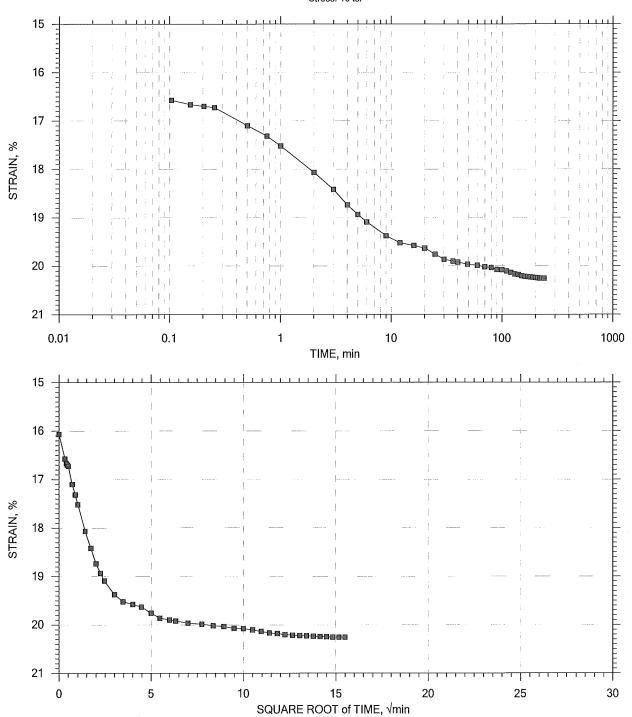


	Project: Silverline	Location: Cheisea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
	Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4
GeoTesting EXPRESS	Depth: 34-36 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		•
	Remarks: System Y	COLUMN TO THE PARTY OF THE PART	
		* · · · · · · · · · · · · · · · · · · ·	

TIME CURVES

Constant Load Step 8 of 14

Stress: 16 tsf

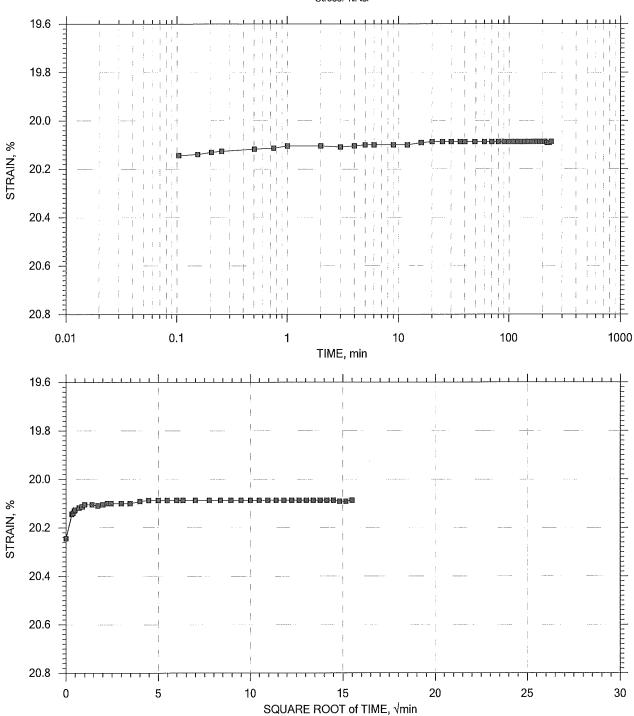


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
	Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4
GeoTesting EXPRESS	Depth: 34-36 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System Y	1 1111111111111111111111111111111111111	

TIME CURVES

Constant Load Step 9 of 14

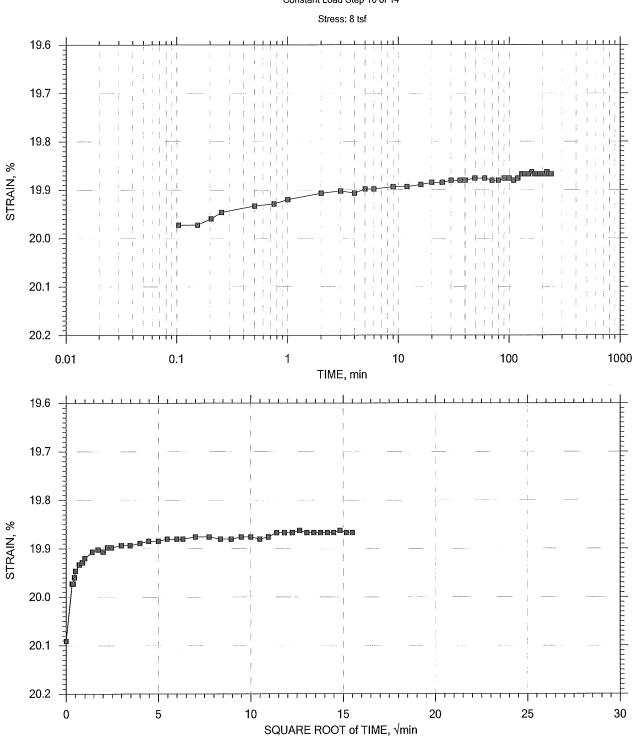




	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.; B-47	Tested By: md	Checked By: jdt
	Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4
GeoTesting	Depth: 34-36 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay		·
	Remarks: System Y		

TIME CURVES

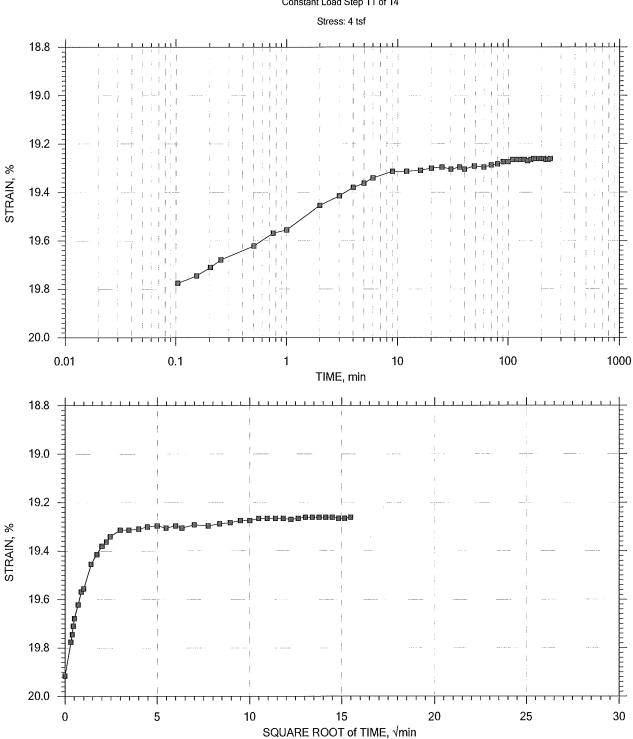
Constant Load Step 10 of 14



	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
	Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4		
Geolesting EXPRESS	Depth: 34-36 ft	Sample Type: intact	Elevation:		
	Description: Moist, greenish gray clay				
	Remarks: System Y				

TIME CURVES

Constant Load Step 11 of 14

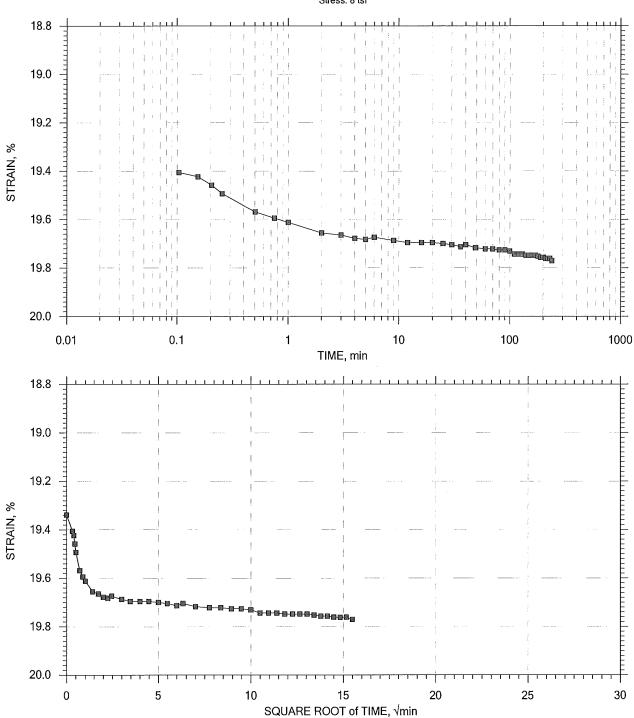


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
Callaga	Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4		
Geolesting	Depth: 34-36 ft	Sample Type: intact	Elevation:		
EXPRESS	Description: Moist, greenish gray clay				
	Remarks: System Y	di 545 - 11 - 3			

TIME CURVES

Constant Load Step 12 of 14





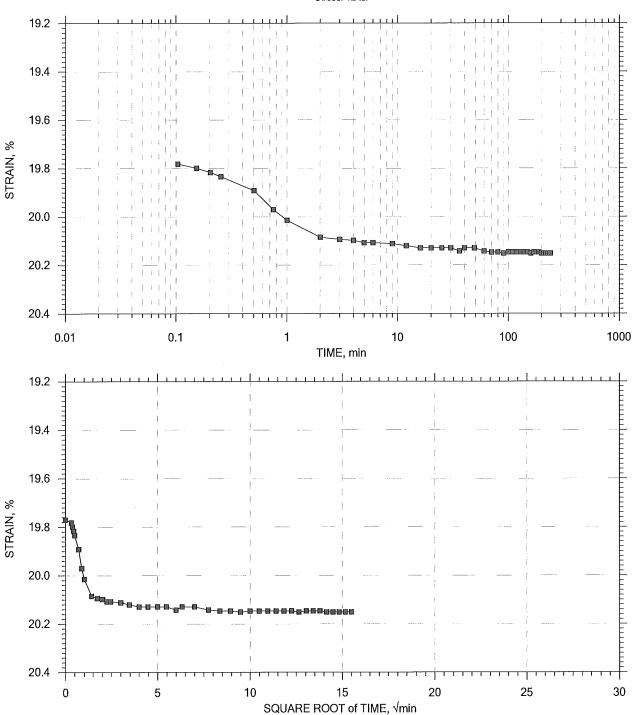
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
	Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4		
Geolesting EXPRESS	Depth: 34-36 ft	Sample Type: intact	Elevation:		
	Description: Moist, greenish gray clay				
	Remarks: System Y				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 14





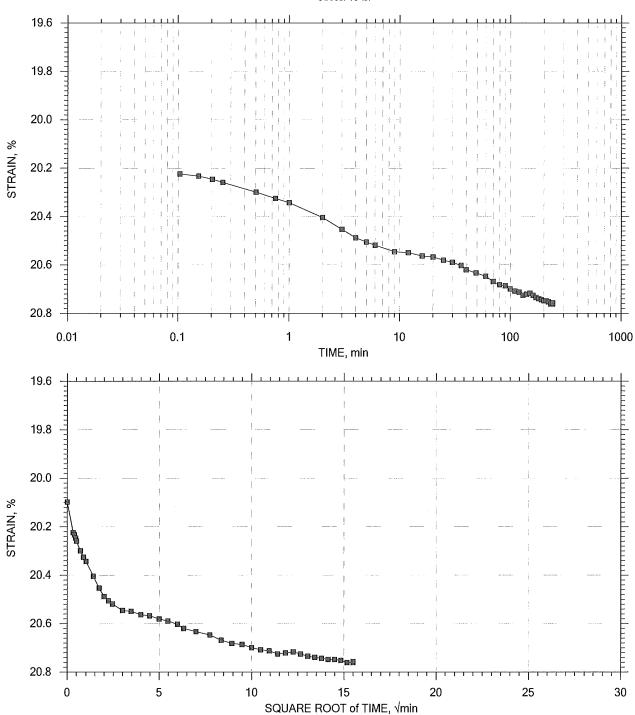
Geolesting EXPRESS	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
	Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4		
	Depth: 34-36 ft	Sample Type: intact	Elevation:		
	Description: Moist, greenish gray clay				
	Remarks: System Y				
	· · · · · · · · · · · · · · · · · · ·				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 14 of 14

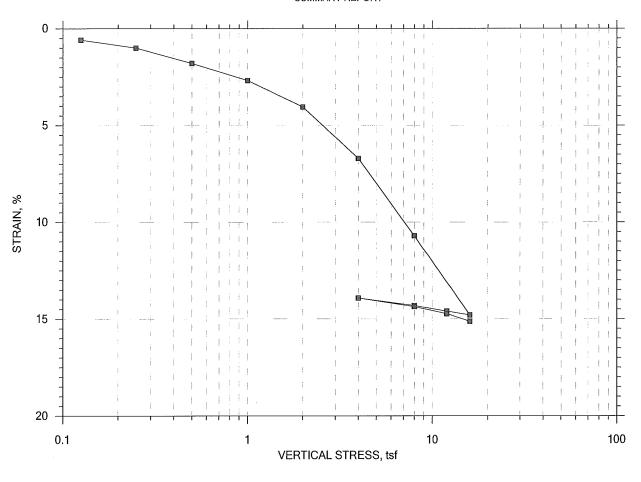


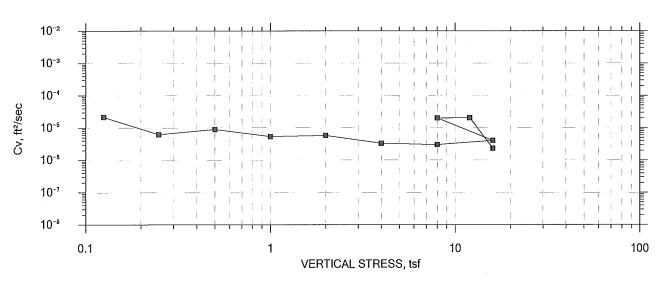


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Geolesting Express	L

Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232			
Boring No.: B-47	Tested By: md	Checked By: jdt			
Sample No.: OT-3	Test Date: 12/20/13	Test No.: IP-4			
Depth: 34-36 ft	Sample Type: intact	Elevation:			
Description: Moist, greenish gray clay					
Remarks: System Y					
	Boring No.: B-47 Sample No.: OT-3 Depth: 34-36 ft Description: Molst, greenish gray clay	Boring No.: B-47 Tested By: md Sample No.: OT-3 Test Date: 12/20/13 Depth: 34-36 ft Sample Type: intact Description: Moist, greenish gray clay			

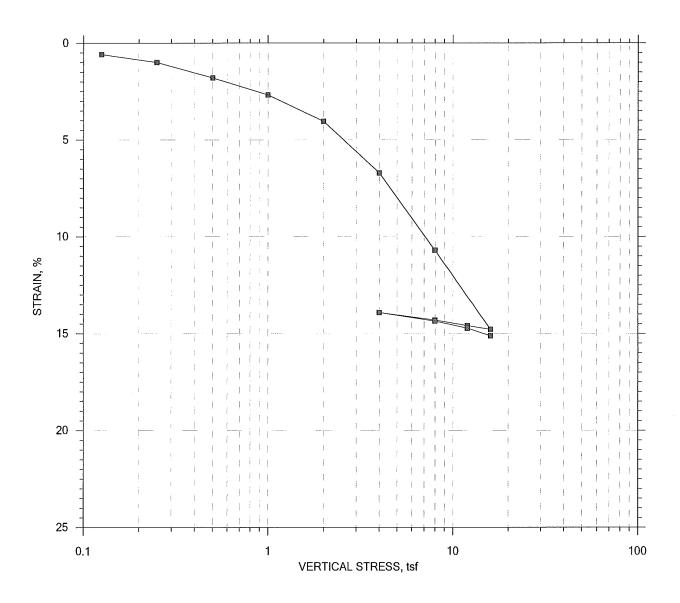
SUMMARY REPORT





	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
	Sample No.: OT-7	Test Date: 12/20/13	Test No.: IP-3		
Geolesting	Depth: 59-61 ft	Sample Type: intact	Elevation:		
EXPRESS	Description: Moist, greenish gray clay				
	Remarks: System R				
	Displacement at End of Increment				

One-Dimensional Consolidation by ASTM D2435 - Method B SUMMARY REPORT



					Before Test	After Test
Current Vertical Effe	ctive Stress:			Water Content, %	30.21	21.51
Preconsolidation Str	ess:			Dry Unit Weight, pcf	94.139	109.46
Compression Ratio:		Saturation, %	98.12	100.00		
Diameter: 2.5 in Height: 1 in		Void Ratio	0.87	0.61		
LL;	PL:	PI:	GS: 2.82			

	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
	Sample No.: OT-7	Test Date: 12/20/13	Test No.: IP-3		
GeoTesting	Depth: 59-61 ft	Sample Type: intact	Elevation:		
EXPRESS	Description: Moist, greenish gray clay				
	Remarks: System R				
	Displacement at End of Increment				

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Silverline Boring No.: B-47 Sample No.: OT-7 Test No.: IP-3 Location: Chelsea, MA Tested By: md Test Date: 12/20/13 Sample Type: intact Project No.: GTX-301232 Checked By: jdt Depth: 59-61 ft Elevation: ---

Soil Description: Moist, greenish gray clay Remarks: System R $\,$

Estimated Specific Gravity: 2.82 Initial Void Ratio: 0.867 Final Void Ratio: 0.606 Liquid Limit: --Plastic Limit: --Plasticity Index: ---

Specimen Diameter: 2.50 in Initial Height: 1.00 in Final Height: 0.86 in

			3	
	Before Co	onsolidation	After Conso	lidation
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	11882	RING		13286
Wt. Container + Wet Soil, qm	278.10	267.40	256.84	156.37
Wt. Container + Dry Soil, gm	216.17	230.75	230.75	130.14
Wt. Container, qm	7.6400	109.45	109.45	8,1900
Wt. Dry Soil, gm	208.53	121.30	121.30	121.95
Water Content, %	29.70	30.21	21.51	21.51
Void Ratio		0.867	0.606	***
Degree of Saturation, %		98.12	100.00	200 State State
Dry Unit Weight, pcf		94.139	109.46	

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Silverline Boring No.: B-47 Sample No.: OT-7 Test No.: IP-3

Location: Chelsea, MA Tested By: md Test Date: 12/20/13 Sample Type: intact

Project No.: GTX-301232 Checked By: jdt Depth: 59-61 ft Elevation: ----

Soil Description: Moist, greenish gray clay Remarks: System \ensuremath{R}

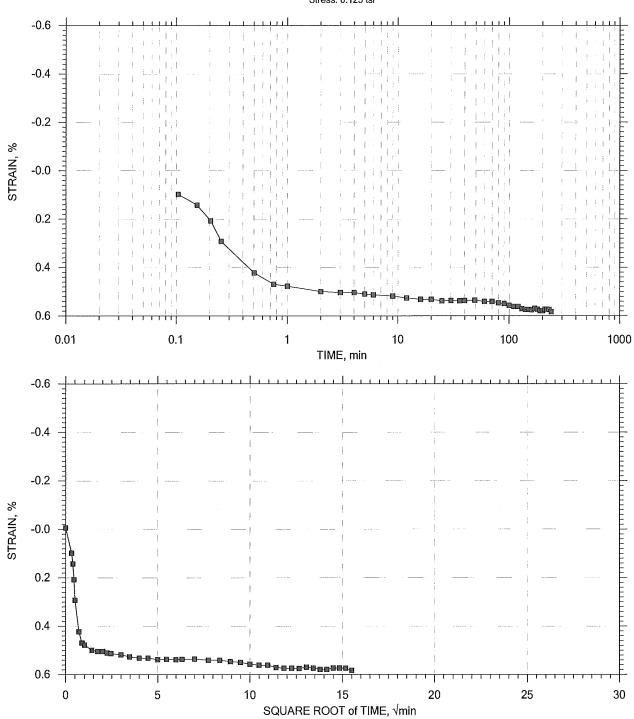
Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k ft/day	
1 2 3 4 5 6 7 8 9 10 11 12	0.125 0.250 0.500 1.00 2.00 4.00 8.00 16.0 12.0 8.00 4.00	0.005820 0.009936 0.01795 0.02674 0.04041 0.06708 0.1070 0.1479 0.1460 0.1431 0.1392	0.856 0.848 0.833 0.817 0.791 0.742 0.667 0.591 0.600 0.607 0.599	0.582 0.994 1.79 2.67 4.04 6.71 10.7 14.8 14.6 14.3 13.9	1.730 5.434 2.854 5.372 3.848 7.902 6.760 4.043 2.004 0.915 2.139	1.41e-005 4.45e-006 8.36e-006 4.37e-006 5.96e-006 2.78e-006 4.62e-006 8.91e-006 1.96e-005 8.46e-006	4.66e-002 3.29e-002 3.20e-002 1.76e-002 1.37e-002 1.33e-002 9.99e-003 5.11e-003 4.94e-004 7.15e-004 1.11e-003	1.77e-003 3.95e-004 7.22e-004 2.07e-004 1.00e-004 8.15e-005 6.37e-005 1.19e-005 3.78e-005 2.23e-005 5.16e-005	
13 14	12.0 16.0	0.1473 0.1512	0.599 0.592 0.585	14.7 15.1	1.043 9.276	1.72e-005 1.72e-005 1.91e-006	9.15e-004 9.72e-004	4.24e-005 5.02e-006	
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k ft/day	Ca १
1 2 3 4 5 6 7 8 9 10 11 12 13	0.125 0.250 0.500 1.00 2.00 4.00 8.00 12.0 8.00 4.00 8.00	0.005820 0.009936 0.01795 0.02674 0.04041 0.06708 0.1070 0.1479 0.1460 0.1431 0.1392 0.1436	0.856 0.848 0.833 0.817 0.791 0.742 0.667 0.591 0.600 0.607 0.599	0.582 0.994 1.79 2.67 4.04 6.71 10.7 14.8 14.6 14.3 13.9 14.4	0.264 0.000 0.693 0.945 0.981 1.440 1.708 1.270 0.000 0.000 0.000	2.15e-005 0.00e+000 8.00e-006 5.77e-006 5.43e-006 3.54e-006 3.42e-006 0.00e+000 0.00e+000 0.00e+000 1.89e-005 0.00e+000	4.66e-002 3.29e-002 3.20e-002 1.76e-002 1.37e-002 9.99e-003 5.11e-003 4.94e-004 7.15e-004 9.75e-004 1.11e-003 9.15e-004	2.70e-003 0.00e+000 6.92e-004 2.73e-004 2.00e-004 1.27e-005 4.71e-005 0.00e+000 0.00e+000 0.00e+000 5.68e-005 0.00e+000	0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000
14	16.0	0.1512	0.585	15.1	0.000	0.00e+000	9.72e-004	0.00e+000	0.00e+000

TIME CURVES

Constant Load Step 1 of 14

Stress: 0.125 tsf



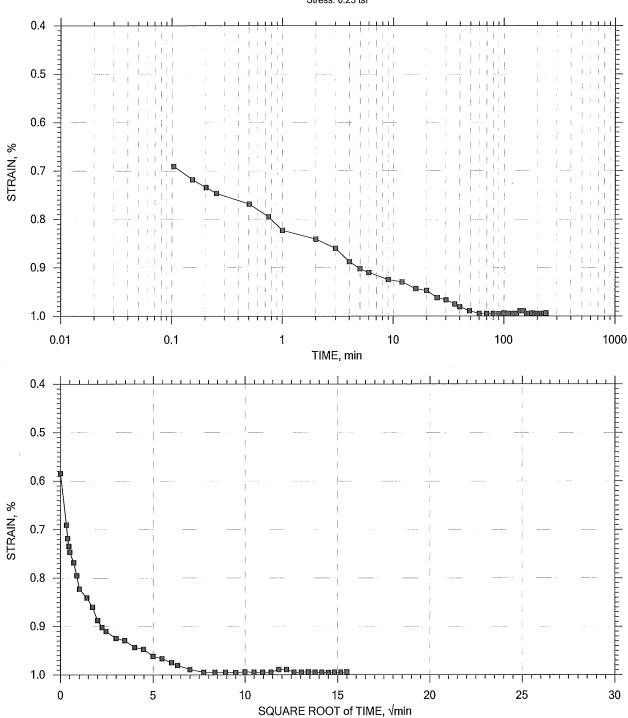
		Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
		Boring No.: B-47 Tested By: md	Tested By: md	Checked By: jdt		
a			Test Date: 12/20/13	Test No.: IP-3		
- 1	- I		Sample Type: intact	Elevation:		
EXPR	XPRESS	Description: Moist, greenish gray clay				
		Remarks: System R				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 14

Stress: 0.25 tsf

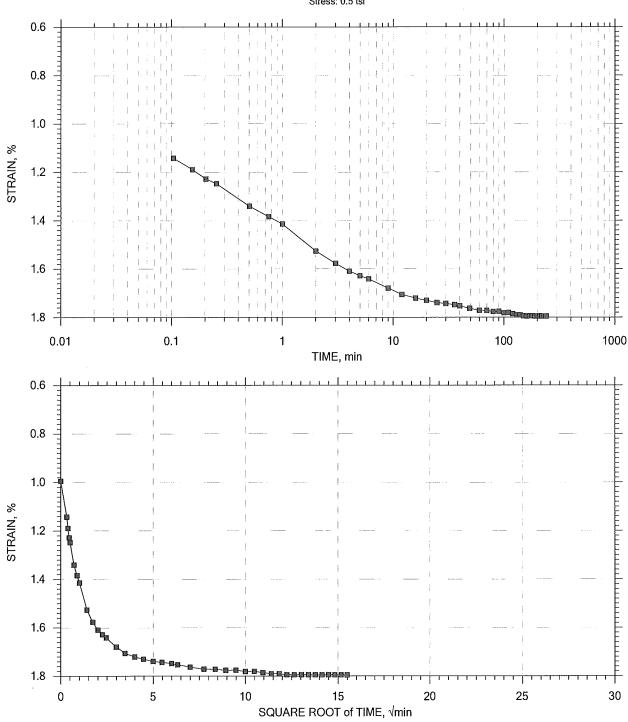


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-47 Tested By: md	Tested By: md	Checked By: jdt	
	Sample No.: OT-7	Test Date: 12/20/13	Test No.: IP-3	
GeoTesting	Depth: 59-61 ft	Sample Type: intact	Elevation:	
EXPRESS	Description: Moist, greenish gray clay			
	Remarks: System R			

TIME CURVES

Constant Load Step 3 of 14

Stress: 0.5 tsf



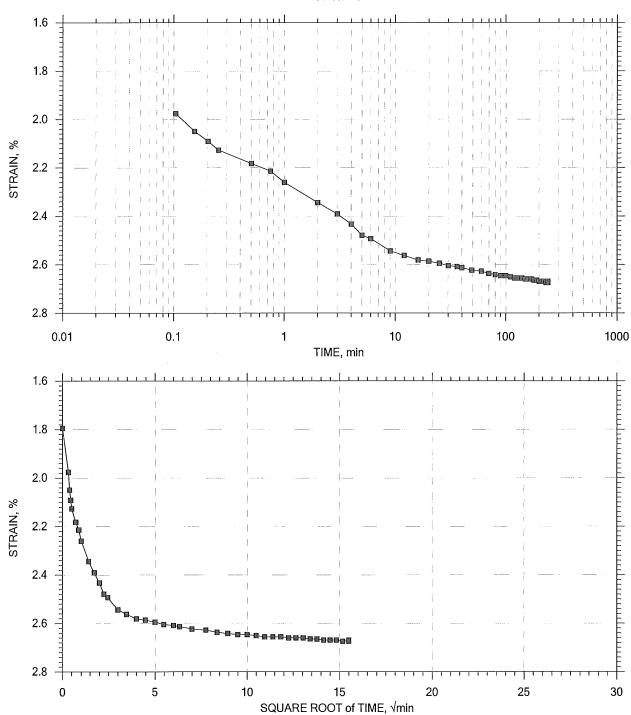
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47 Test	Tested By: md	Checked By: jdt
	Sample No.: OT-7	Test Date: 12/20/13	Test No.: IP-3
Geolesting	Depth: 59-61 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay		
	Remarks: System R		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 14





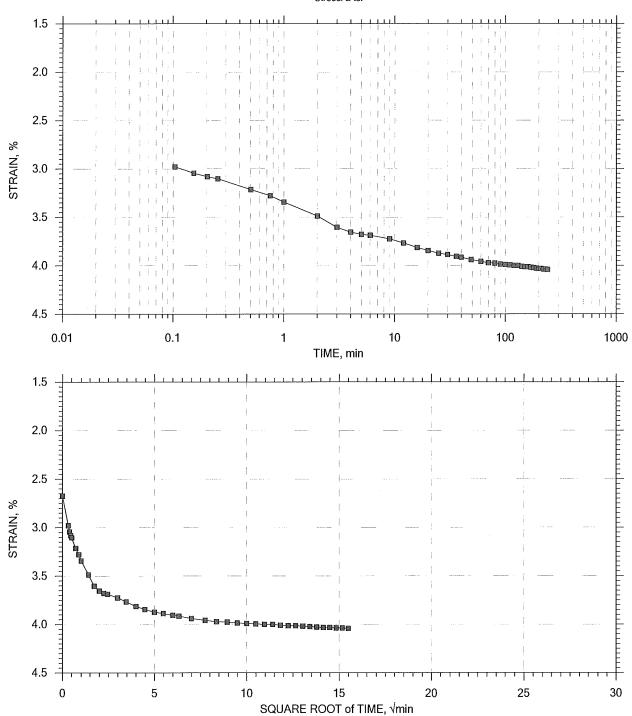
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	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
) J	Boring No.: B-47	Tested By: md	Checked By: jdt		
	Sample No.: OT-7	Test Date: 12/20/13	Test No.: IP-3		
	Depth: 59-61 ft	Sample Type: intact	Elevation:		
	Description: Moist, greenish gray clay				
	Remarks: System R				

TIME CURVES

Constant Load Step 5 of 14



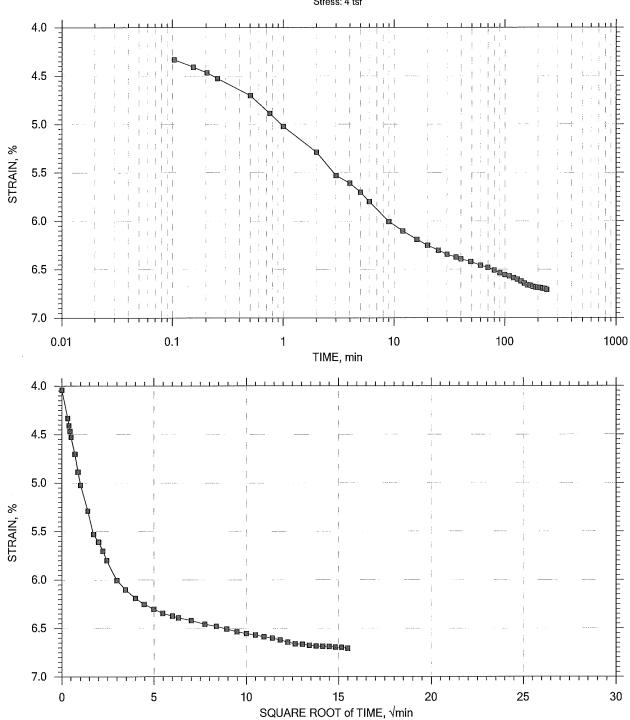


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-47	Tested By: md	Checked By: jdt	
Collegation	Sample No.: OT-7	Test Date: 12/20/13	Test No.: IP-3	
GeoTesting	Depth: 59-61 ft	Sample Type: intact	Elevation:	
EXPRESS	Description: Moist, greenish gray clay			
	Remarks: System R			

TIME CURVES

Constant Load Step 6 of 14



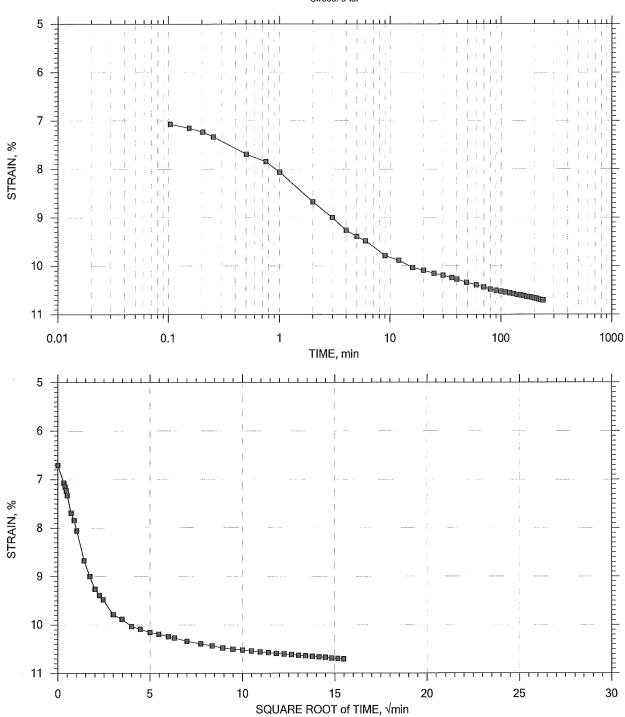


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
	Sample No.: OT-7 Test Date: 12/20/13	Test Date: 12/20/13	Test No.: IP-3
GeoTesting	Depth: 59-61 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay		
	Remarks: System R		

TIME CURVES

Constant Load Step 7 of 14



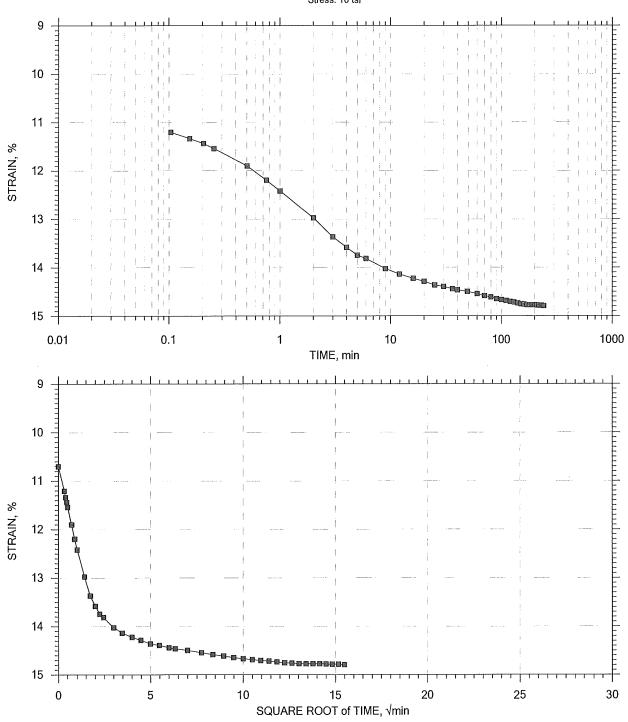


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
	Sample No.: OT-7 Test Date: 12/20/13	Test Date: 12/20/13	Test No.: IP-3		
Geolesting	Depth: 59-61 ft	Sample Type: intact	Elevation:		
EXPRESS	Description: Moist, greenish gray clay				
	Remarks: System R				

TIME CURVES

Constant Load Step 8 of 14

Stress: 16 tsf

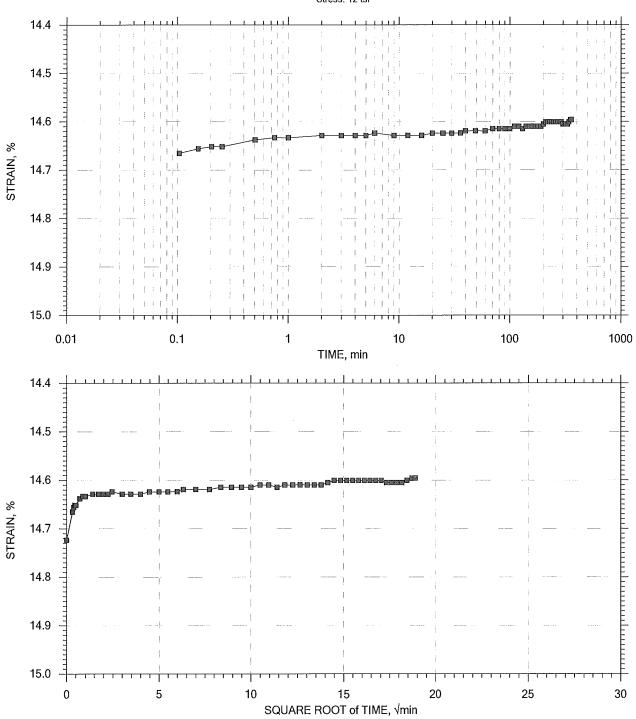


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47 Tested By: md	Tested By: md	Checked By: jdt
	Sample No.: OT-7	Test Date: 12/20/13	Test No.: IP-3
GeoTesting	Depth: 59-61 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay		
	Remarks: System R		
	# - M - M - M - M - M - M - M - M - M -		

TIME CURVES

Constant Load Step 9 of 14

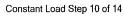


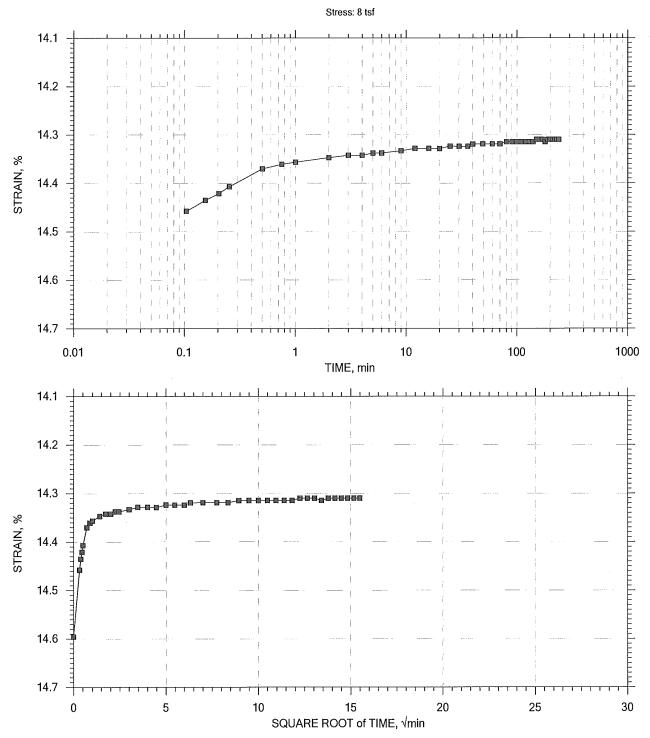


		Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
Ge EXP		Boring No.: B-47	Checked By: jdt			
			Test Date: 12/20/13	Test No.: IP-3		
	eolesting	Depth: 59-61 ft	Sample Type: intact	Elevation:		
	XPRESS	Description: Moist, greenish gray clay				
		Remarks: System R				
			31.20.000			

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES



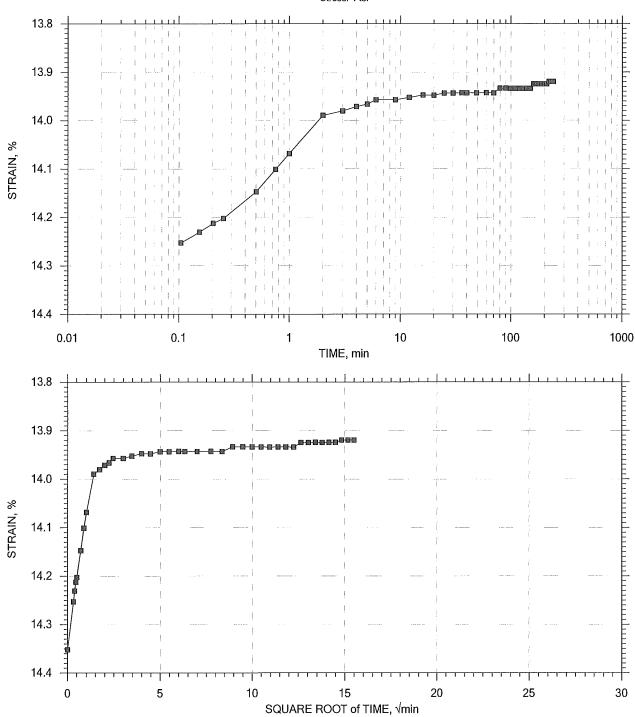


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
	Sample No.: OT-7	Test Date: 12/20/13	Test No.: IP-3
GeoTesting	Depth: 59-61 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay		
	Remarks: System R		

TIME CURVES

Constant Load Step 11 of 14





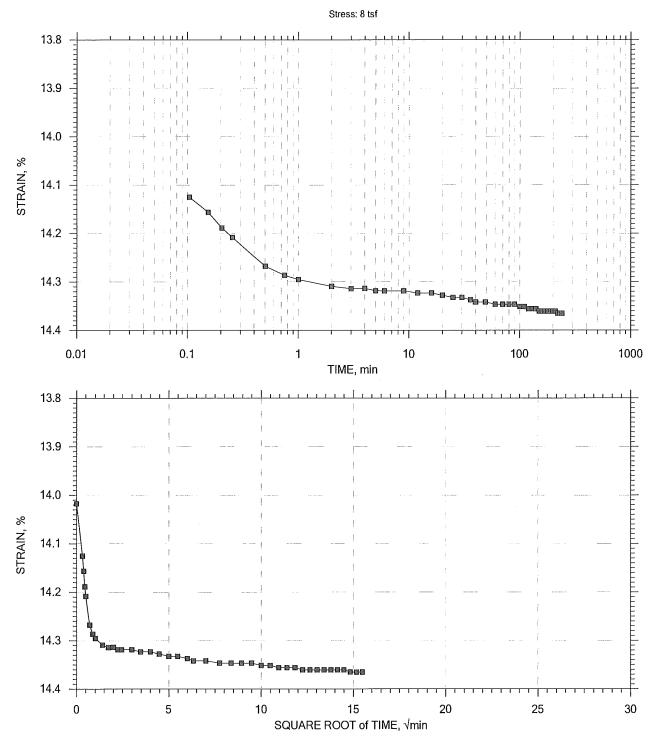
GeoTesting	-
EXPRESS	

	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-47	Tested By: md	Checked By: jdt	
	Sample No.: OT-7	Test Date: 12/20/13	Test No.: IP-3	
	Depth: 59-61 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay			
	Remarks: System R			

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 14

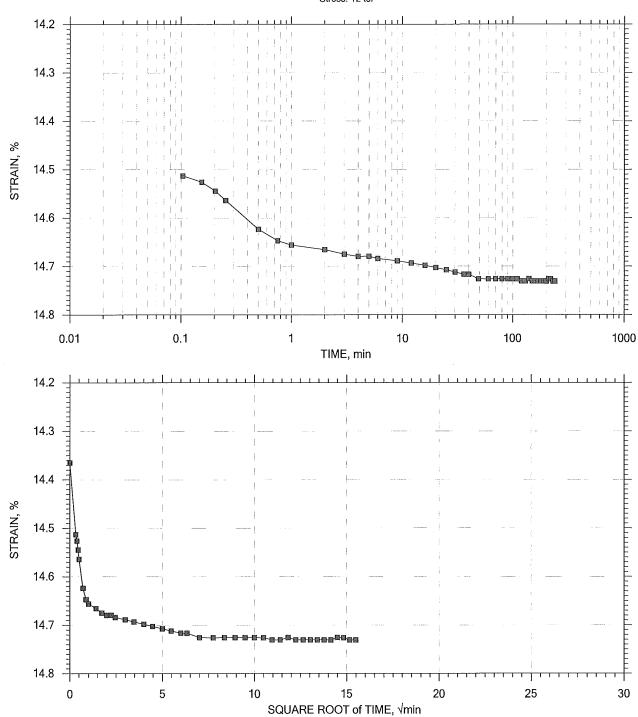


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
Castantina	Sample No.: OT-7	Test Date: 12/20/13	Test No.: IP-3
Geolesting EXPRESS	Depth: 59-61 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay		
	Remarks: System R		
			- 379554

TIME CURVES

Constant Load Step 13 of 14



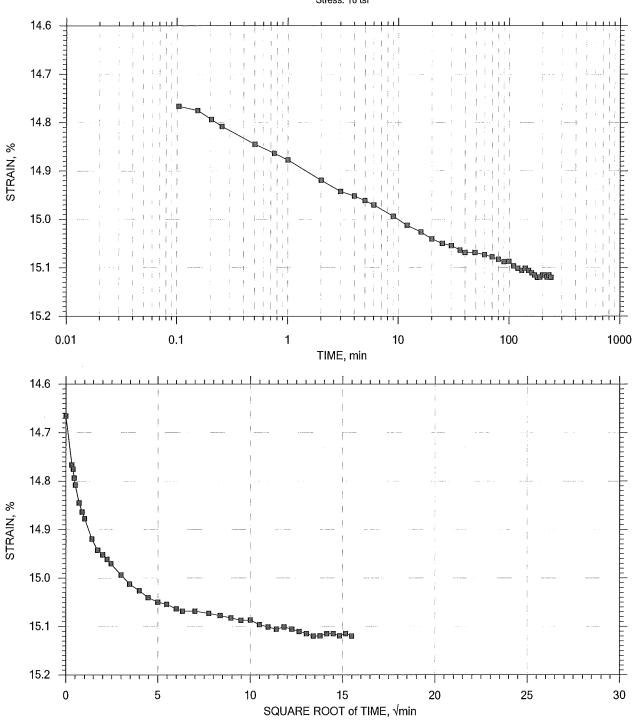


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
GeoTesting EXPRESS	Sample No.: OT-7	Test Date: 12/20/13	Test No.: IP-3
	Depth: 59-61 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System R		
	,		

TIME CURVES

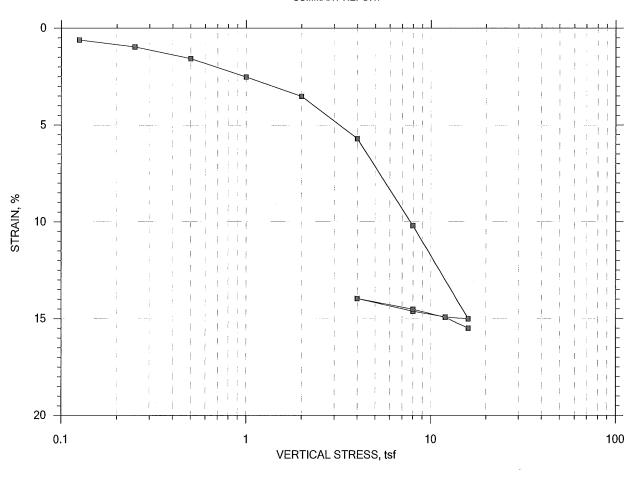
Constant Load Step 14 of 14

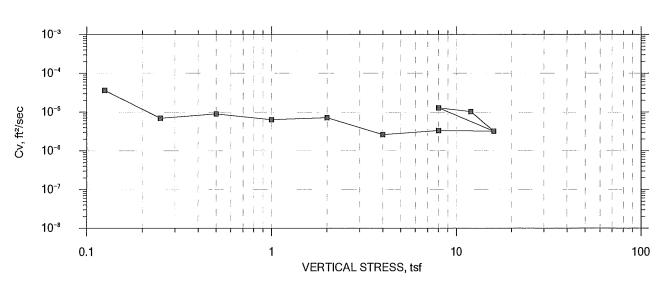




	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
	Sample No.: OT-7	Test Date: 12/20/13	Test No.: IP-3
Geolesting	Depth: 59-61 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay		
	Remarks: System R		

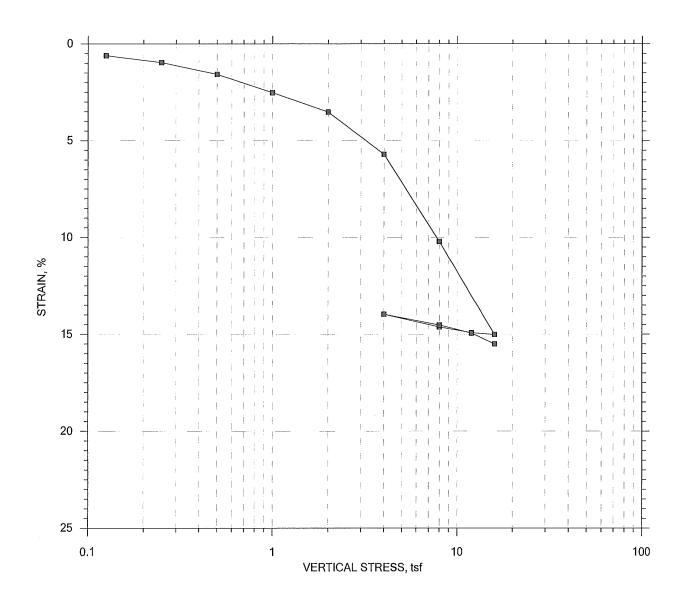
SUMMARY REPORT





		Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
		Boring No.: B-47	Tested By: md	Checked By: jdt		
		Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2		
	Geolesting Express	Depth: 79-81 ft	Sample Type: intact	Elevation:		
* ^		Description: Moist, greenish gray clay with sand				
		Remarks: System X				
		Displacement at End of Increment				

SUMMARY REPORT



					Before Test	After Test
Current Vertical Effective Stress:			Water Content, %	29.85	22.06	
Preconsolidation Stress:			Dry Unit Weight, pcf	95.261	108.25	
Compression Ratio:				Saturation, %	99.75	100.00
Diameter: 2.5 in Height:		Height: 1 in		Void Ratio	0.84	0.62
LL;	PL:	PI:	GS: 2.81			

	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-47	Tested By: md	Checked By: jdt		
GeoTesting	Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2		
EXPRESS	Depth: 79-81 ft	Sample Type: intact	Elevation:		
EAPRESS	Description: Moist, greenish gray clay with sand				
	Remarks: System X				
	Displacement at End of Increment	COLUMN AND AND AND AND AND AND AND AND AND AN			

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Silverline Boring No.: B-47 Sample No.: OT-9 Test No.: IP-2

Location: Chelsea, MA Tested By: md Test Date: 12/19/13 Sample Type: intact

Project No.: GTX-301232 Checked By: jdt Depth: 79-81 ft Elevation: ---

Soil Description: Moist, greenish gray clay with sand Remarks: System \boldsymbol{X}

Liquid Limit: --Plastic Limit: ---Estimated Specific Gravity: 2.81 Initial Void Ratio: 0.840 Final Void Ratio: 0.619 Plasticity Index: --- Specimen Diameter: 2.50 in Initial Height: 1.00 in Final Height: 0.88 in

	-		=	
	Before Consolidation		After Consol	idation
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	11007	RING		13570
Wt. Container + Wet Soil, gm	469.30	268.27	258.71	157.85
Wt. Container + Dry Soil, gm	367.14	231.64	231.64	130.83
Wt. Container, gm	7.5700	108.89	108.89	8.3300
Wt. Dry Soil, qm	359.57	122.75	122.75	122.50
Water Content, %	28.41	29.85	22.06	22.06
Void Ratio		0.840	0.619	
Degree of Saturation, %		99.75	100.00	
Dry Unit Weight, pcf		95.261	108.25	

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B $\,$

Project: Silverline Boring No.: B-47 Sample No.: OT-9 Test No.: IP-2

Location: Chelsea, MA Tested By: md Test Date: 12/19/13 Sample Type: intact

Project No.: GTX-301232 Checked By: jdt Depth: 79-81 ft Elevation: ---

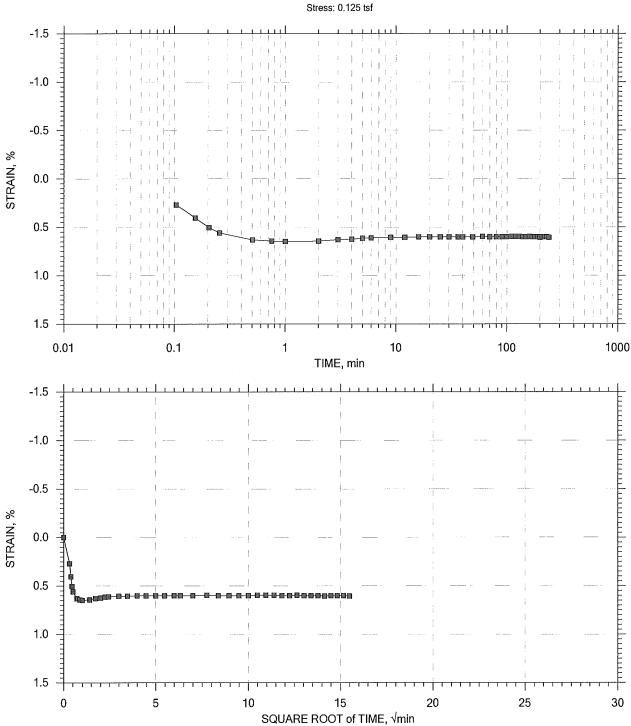
Soil Description: Moist, greenish gray clay with sand Remarks: System \boldsymbol{X}

Displacement at End of Increment

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k ft/day	
1 2 3 4 5 6 7 8 9 10 11 12 13 14	0.125 0.250 0.500 1.00 2.00 4.00 8.00 12.0 8.00 4.00 8.00	0.006054 0.009641 0.01574 0.02519 0.03521 0.05705 0.1020 0.1501 0.1492 0.1462 0.1397 0.1452 0.1454 0.1454	0.829 0.822 0.811 0.794 0.775 0.652 0.564 0.566 0.571 0.583 0.573 0.565	0.605 0.964 1.57 2.52 3.52 5.70 10.2 15.0 14.9 14.6 14.0 14.5	0.894 3.729 3.744 3.352 2.946 10.640 6.208 5.013 0.880 1.004 2.292 1.438 2.670 6.825	2.73e-005 6.48e-006 6.39e-006 7.02e-006 7.83e-006 2.10e-006 3.35e-006 3.74e-005 1.78e-005 7.86e-006 1.26e-005 6.68e-006 2.58e-006	4.84e-002 2.87e-002 2.44e-002 1.89e-002 1.00e-002 1.12e-002 6.01e-003 2.44e-004 1.63e-003 1.37e-003 1.37e-003	3.56e-003 5.01e-004 4.20e-004 3.58e-004 6.18e-005 1.02e-004 6.06e-005 1.33e-005 3.57e-005 3.46e-005 4.65e-005 9.61e-006	
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k ft/day	Ca %
1 2 3 4 5 6 7 8 9 10 11 12 13 14	0.125 0.250 0.500 1.00 2.00 4.00 8.00 12.0 8.00 4.00 8.00 4.00	0.006054 0.009641 0.01574 0.02519 0.03521 0.05705 0.1020 0.1501 0.1492 0.1462 0.1397 0.1452 0.1494	0.829 0.822 0.811 0.794 0.775 0.652 0.564 0.571 0.583 0.573 0.565 0.555	0.605 0.964 1.57 2.52 3.52 5.70 10.2 15.0 14.9 14.6 14.0 14.5	0.000 0.000 0.526 0.000 0.000 1.620 1.626 0.000 0.145 0.000 0.335 0.197	0.00e+000 0.00e+000 1.06e-005 0.00e+000 0.00e+000 2.98e-006 0.00e+000 2.85e-005 0.00e+000 1.25e-005 2.10e-005 0.00e+000	4.84e-002 2.87e-002 2.44e-002 1.89e-002 1.09e-002 1.12e-002 6.01e-003 2.44e-004 1.63e-003 1.37e-003 1.37e-003	0.00e+000 0.00e+000 6.95e-004 0.00e+000 0.00e+000 9.04e-005 4.34e-005 0.00e+000 5.72e-005 0.00e+000 4.63e-005 6.04e-005 0.00e+000	0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000

TIME CURVES

Constant Load Step 1 of 14



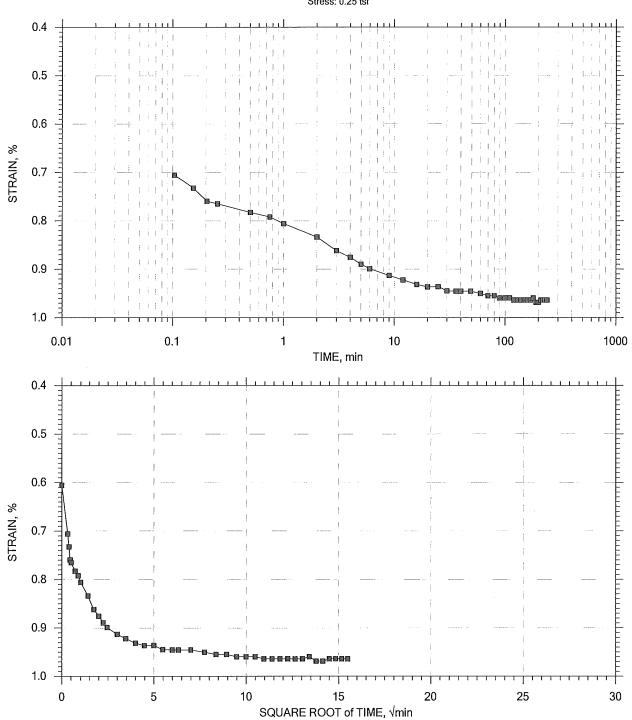
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
Cartachiron	Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2
GeoTesting	Depth: 79-81 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay with sand		
	Remarks: System X		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 14

Stress: 0.25 tsf

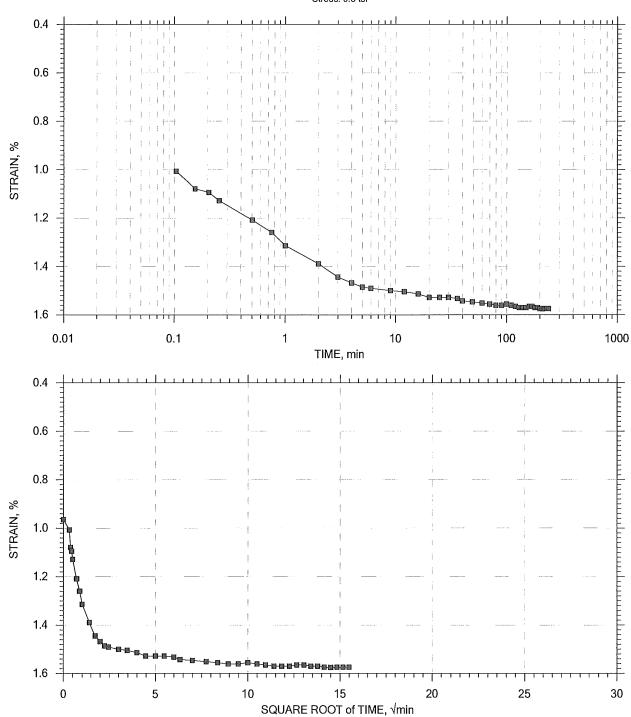


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-47	Tested By: md	Checked By: jdt	
Castantina	Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2	
Geolesting	Depth: 79-81 ft	Sample Type: intact	Elevation:	
EXPRESS	Description: Moist, greenish gray clay with sand			
	Remarks: System X	·		

TIME CURVES

Constant Load Step 3 of 14

Stress: 0.5 tsf



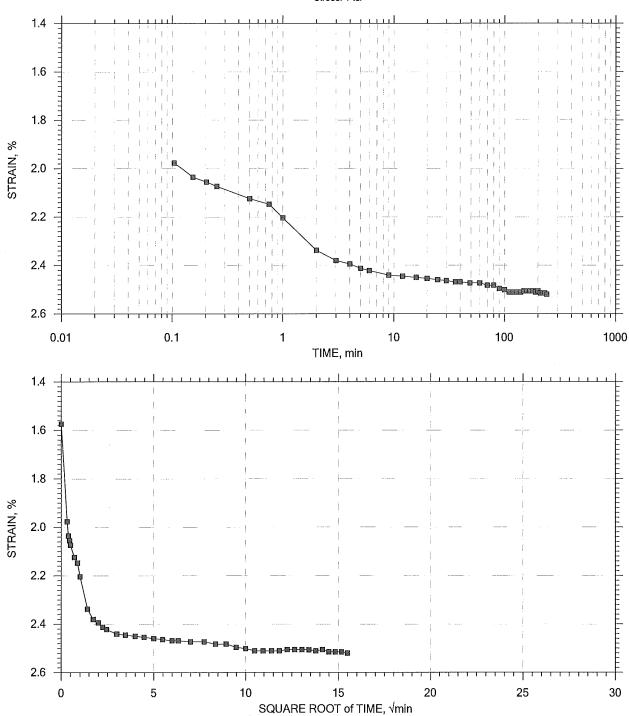
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-47	Tested By: md	Checked By: jdt	
Castanting	Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2	
Geolesting	Depth: 79-81 ft	Sample Type: intact	Elevation:	
EXPRESS	Description: Moist, greenish gray clay with sand			
	Remarks: System X			

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 14





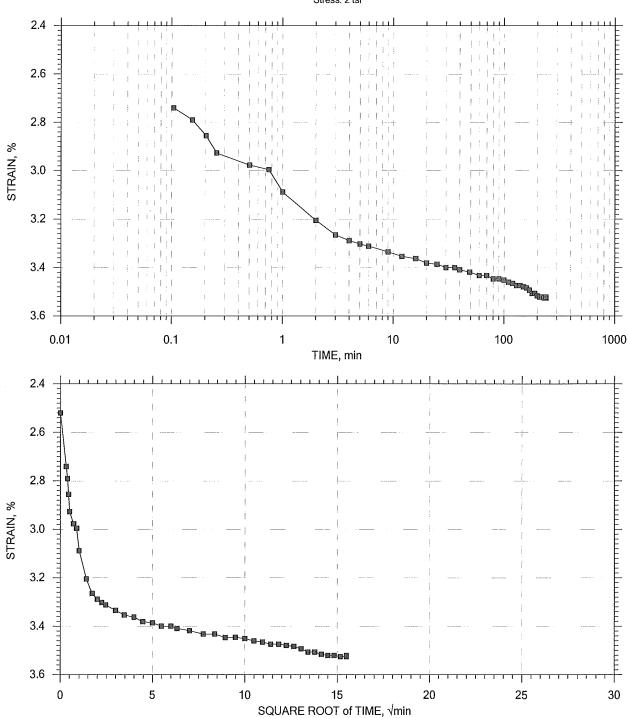
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	l
Geolesting	ŀ
EXPRESS	ŀ

	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232			
Ī	Boring No.: B-47	Tested By: md	Checked By: jdt			
	Sample No.: OT-9	Test Date: 12/19/13 Test No.: IP-2				
	Depth; 79-81 ft	Sample Type: intact	Elevation:			
Ī	Description: Moist, greenish gray clay with sand					
Ī	Remarks: System X					

TIME CURVES

Constant Load Step 5 of 14







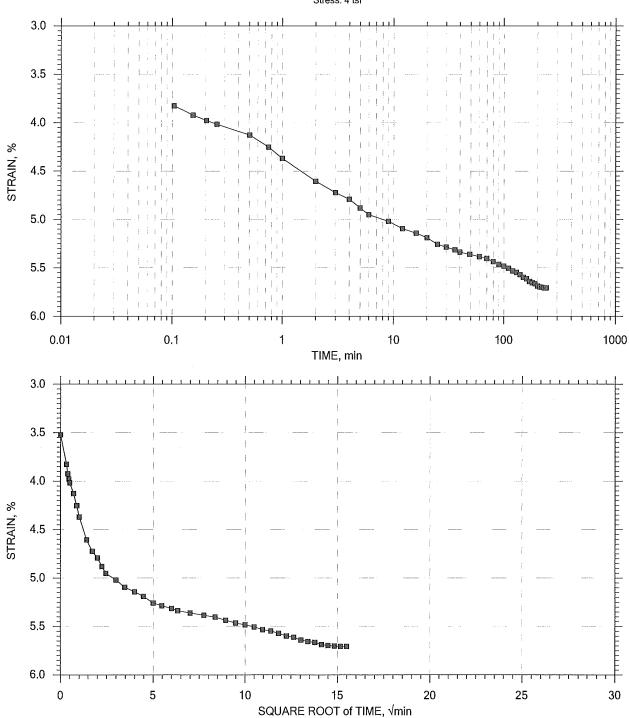
Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232			
Boring No.: B-47	Tested By: md	Checked By: jdt			
Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2			
Depth: 79-81 ft	Depth: 79-81 ft Sample Type: intact Elevation:				
Description: Moist, greenish gray clay with sand	Description: Moist, greenish gray clay with sand				
Remarks: System X					

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 14





GeoTestina	
EXPRESS	

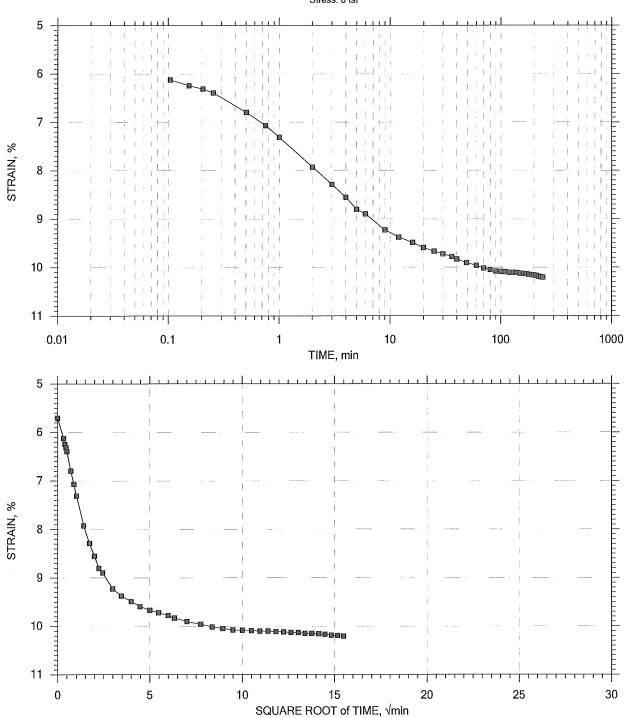
Ò	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232			
	Boring No.: B-47	Tested By: md	Checked By: jdt			
	Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2			
	Depth: 79-81 ft Sample Type: intact Elevation:					
	Description: Moist, greenish gray clay with sand	Description: Moist, greenish gray clay with sand				
	Remarks: System X					
1						

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 14



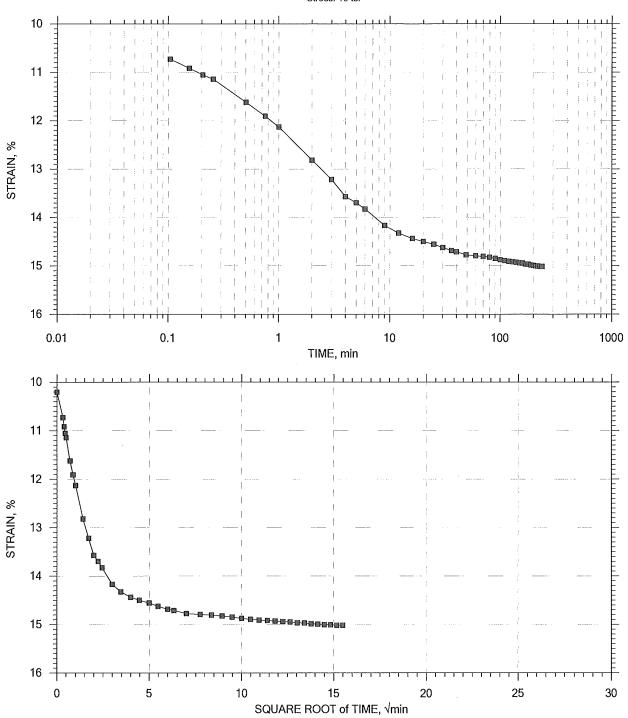


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
Collegation	Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2
Geolesting	Depth: 79-81 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay with sand		
	Remarks: System X		

TIME CURVES

Constant Load Step 8 of 14

Stress: 16 tsf

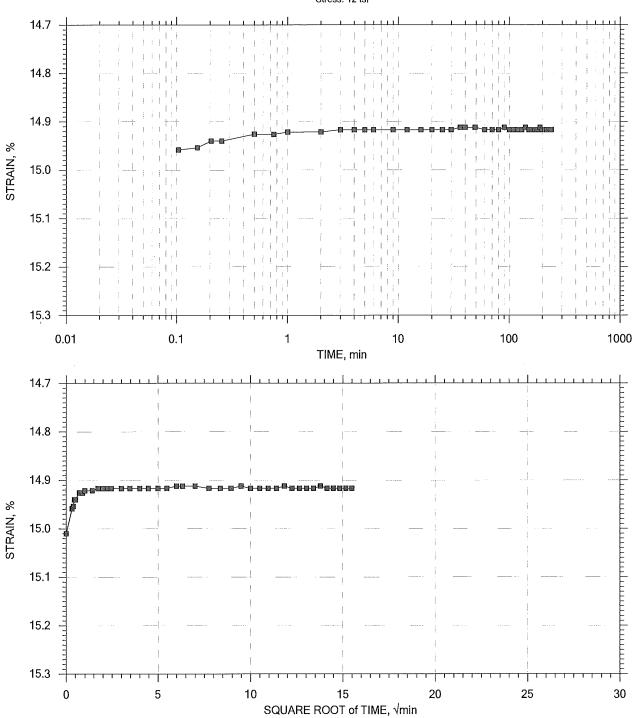


		Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
		Boring No.: B-47	Tested By: md	Checked By: jdt
Castan		Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2
Geoles'	ting	Depth: 79-81 ft	Sample Type: intact	Elevation:
EXPRESS		Description: Moist, greenish gray clay with sand		
		Remarks: System X		

TIME CURVES

Constant Load Step 9 of 14

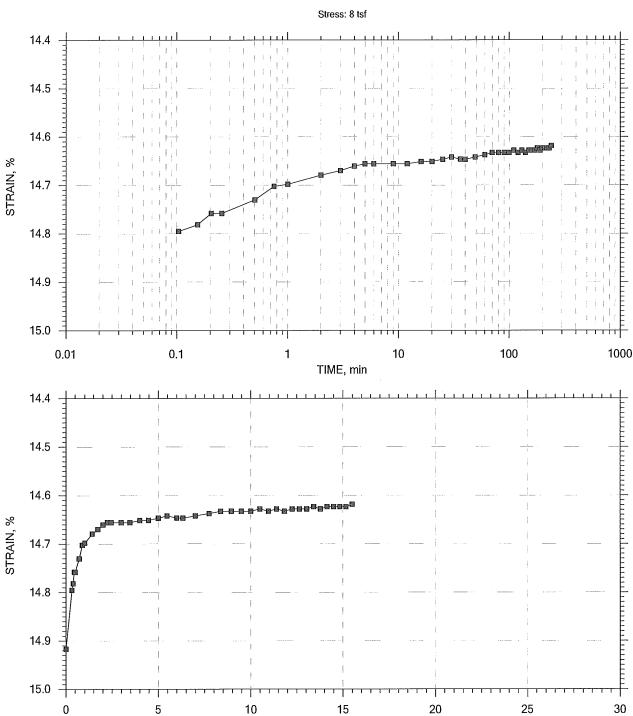




		Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
		Boring No.: B-47	Tested By: md	Checked By: jdt
6		Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2
UC	eolesting	Depth: 79-81 ft	Sample Type: intact	Elevation:
EXPH	rness	Description: Moist, greenish gray clay with sand		
		Remarks: System X		

TIME CURVES

Constant Load Step 10 of 14



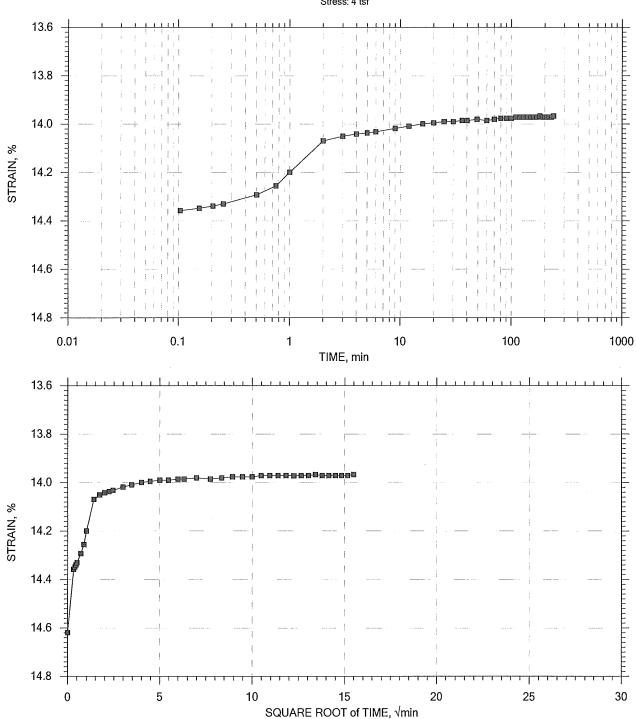
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
Castana	Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2
GeoTesting	Depth: 79-81 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay with sand		
	Remarks: System X		

SQUARE ROOT of TIME, √min

TIME CURVES

Constant Load Step 11 of 14



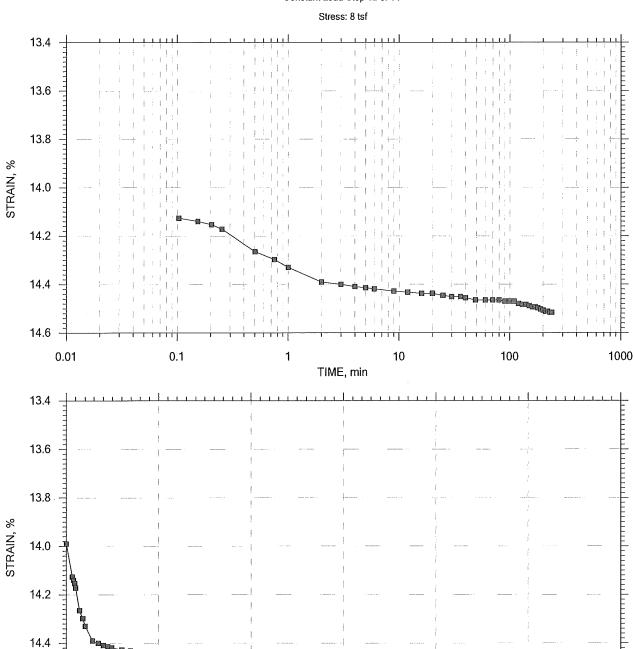


1		Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
		Boring No.: B-47	Tested By: md	Checked By: jdt
		Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2
ľ	Geolesting EXPRESS	Depth: 79-81 ft	Sample Type: intact	Elevation:
EXP	EXPRESS	Description: Moist, greenish gray clay with sand		
		Remarks: System X		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 14



	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
	Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2
Geolesting	Depth: 79-81 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay with sand		
	Remarks: System X	MANAGEMENT (1997)	

10

15

SQUARE ROOT of TIME, $\sqrt{\text{min}}$

20

25

30

14.6

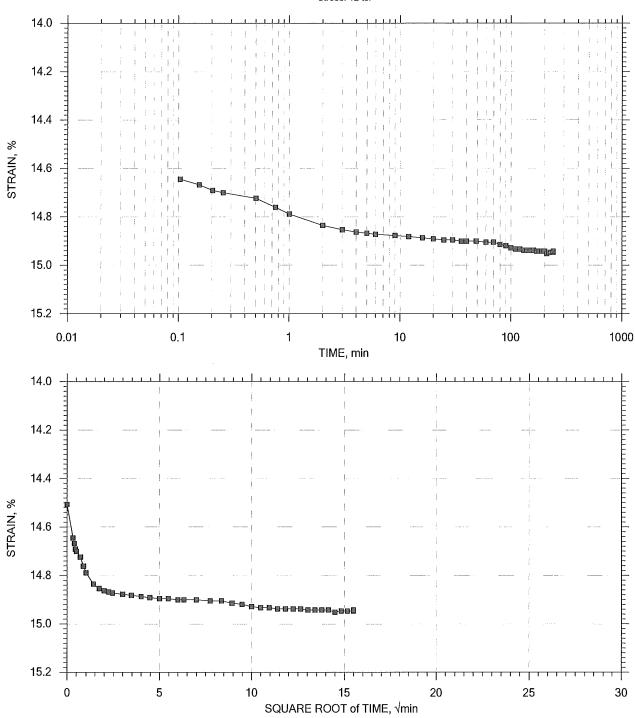
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5

TIME CURVES

Constant Load Step 13 of 14





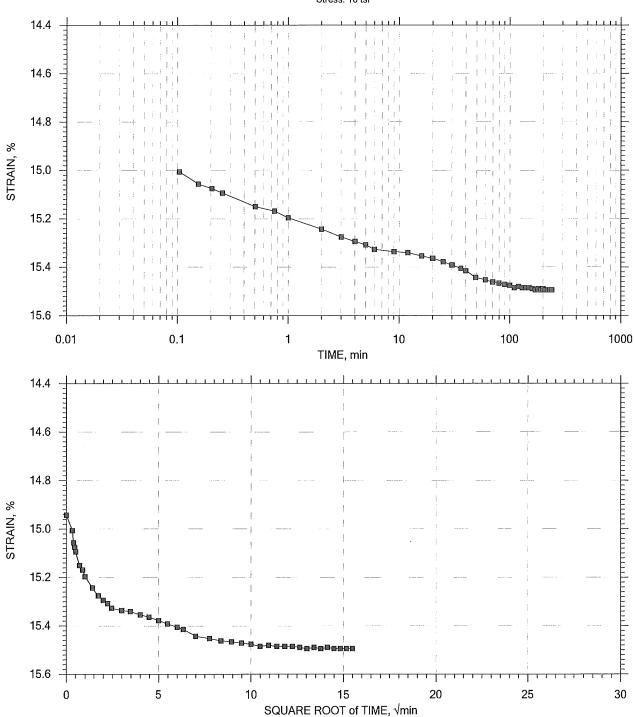
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
Castactina	Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2
Geolesting	Depth: 79-81 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay with sand		
	Remarks: System X		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

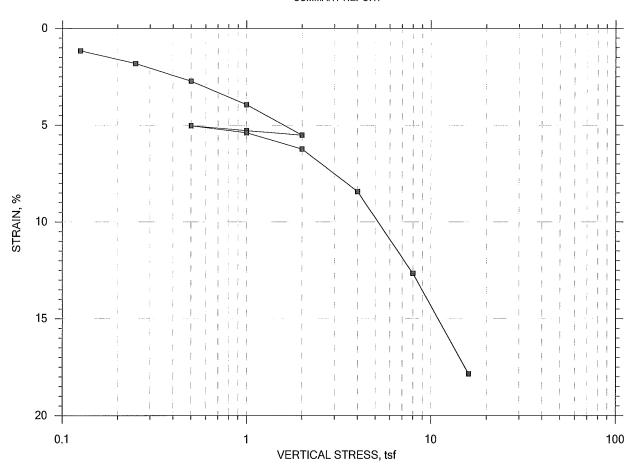
Constant Load Step 14 of 14

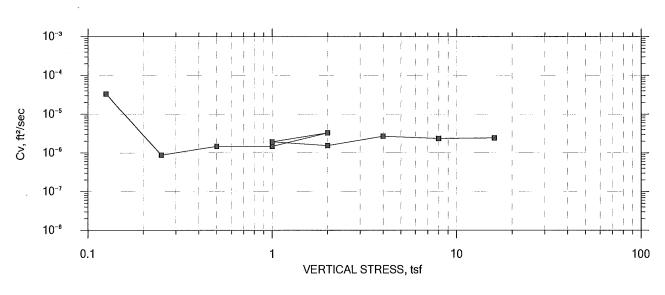
Stress: 16 tsf



	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-47	Tested By: md	Checked By: jdt
Castandina	Sample No.: OT-9	Test Date: 12/19/13	Test No.: IP-2
Geolesting EXPRESS	Depth: 79-81 ft	Sample Type: intact	Elevation:
EAPRESS	Description: Moist, greenish gray clay with sand		
	Remarks: System X		

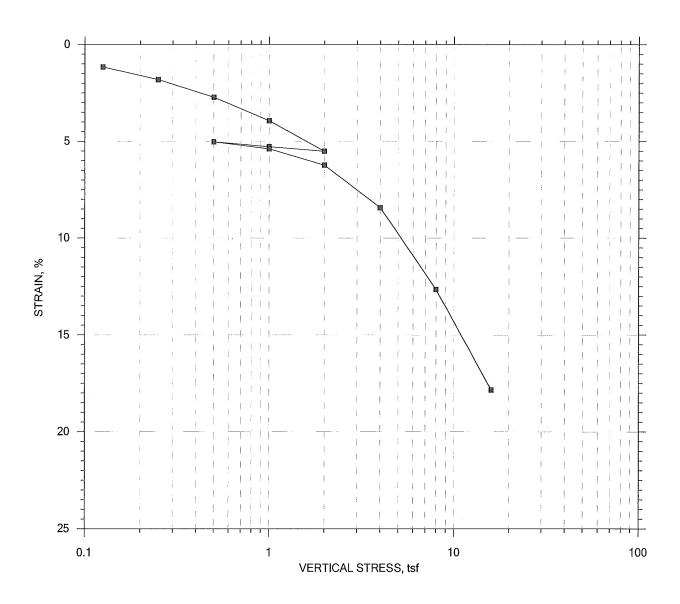
SUMMARY REPORT





	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-50	Tested By: md	Checked By: jdt	
Geolesting	Sample No.: OT-1	Test Date: 01/10/14	Test No.: IP-5	
EXPRESS	Depth: 19-21 ft	Sample Type: intact	Elevation:	
EAPRESS	Description: Moist, greenish gray clay			
	Remarks: System S			
	Displacement at End of Increment			

One-Dimensional Consolidation by ASTM D2435 - Method B SUMMARY REPORT



					Before Test	After Test
Current Vertical Effe	ective Stress:			Water Content, %	35.91	26.22
Preconsolidation Str	Preconsolidation Stress:		Dry Unit Weight, pcf	85.881	99.861	
Compression Ratio:	Compression Ratio:			Saturation, %	98.68	100.00
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.00	0.72
LL:	PL:	PI:	GS: 2.75			

	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-50	Tested By: md	Checked By: jdt	
Collective	Sample No.: OT-1	Test Date: 01/10/14	Test No.: IP-5	
Geolesting EXPRESS	Depth: 19-21 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay			
	Remarks: System S			
	Displacement at End of Increment			

One-Dimensional Consolidation by ASTM D2435 - Method $\ensuremath{\mathsf{B}}$

Project: Silverline Boring No.: B-50 Sample No.: OT-1 Test No.: IP-5

Location: Chelsea, MA Tested By: md Test Date: 01/10/14 Sample Type: intact

Project No.: GTX-301232 Checked By: jdt Depth: 19-21 ft Elevation: ---

Soil Description: Moist, greenish gray clay Remarks: System ${\tt S}$

Estimated Specific Gravity: 2.75 Initial Void Ratio: 1.00 Final Void Ratio: 0.722 Liquid Limit: --Plastic Limit: --Plasticity Index: --- Specimen Diameter: 2.50 in Initial Height: 1.00 in Final Height: 0.86 in

	Before Co	onsolidation	After Conso	lidation
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	11869	RING		11964
Wt. Container + Wet Soil, gm	163.60	260.40	249.67	143.88
Wt. Container + Dry Soil, gm	116.67	220.66	220.66	115.59
Wt. Container, qm	7.5500	110.00	110.00	7.6800
Wt. Dry Soil, gm	109.12	110.66	110.66	107.91
Water Content, %	43.01	35.91	26.22	26.22
Void Ratio		1.00	0,722	
Degree of Saturation, %		98.68	100,00	*** ***
Dry Unit Weight, pcf		85.881	99.861	

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Silverline Boring No.: B-50 Sample No.: OT-1 Test No.: IP-5

Location: Chelsea, MA Tested By: md Test Date: 01/10/14 Sample Type: intact

Project No.: GTX-301232 Checked By: jdt Depth: 19-21 ft Elevation: ---

Soil Description: Moist, greenish gray clay Remarks: System ${\tt S}$

Displacement at End of Increment

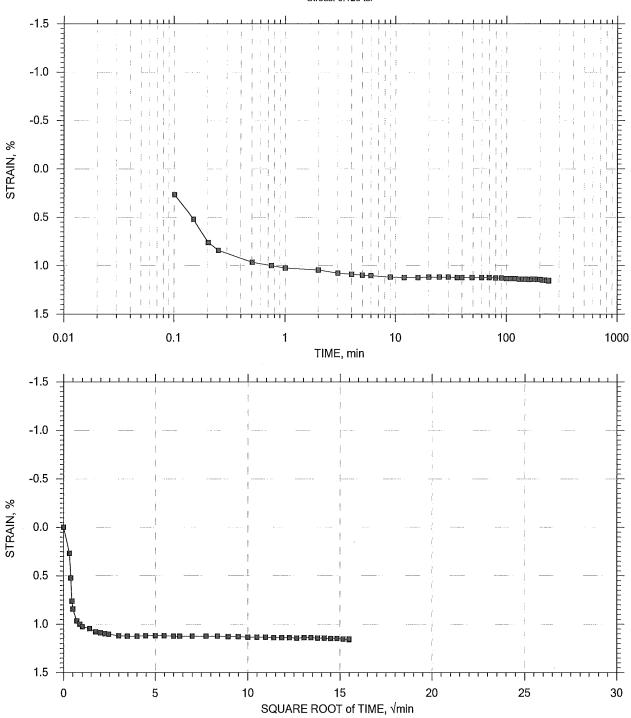
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k ft/day	
1 2 3 4 5 6 7 8 9 10 11	0.125 0.250 0.500 1.00 2.00 1.00 0.500 1.00 2.00 4.00 8.00	0.01153 0.01807 0.02720 0.03933 0.05514 0.05275 0.05030 0.05385 0.06233 0.08429 0.1266 0.1784	0.980 0.966 0.948 0.924 0.892 0.897 0.902 0.895 0.878 0.834 0.749	1.15 1.81 2.72 3.93 5.51 5.28 5.03 5.38 6.23 8.43 12.7	0.958 20.678 17.830 11.342 5.938 7.030 0.000 12.798 14.064 8.205 7.929 5.465	2.53e-005 1.15e-006 1.31e-006 2.02e-006 3.75e-006 0.00e+000 1.72e-006 1.55e-006 2.57e-006 2.48e-006 3.22e-006	9.22e-002 5.23e-002 3.65e-002 2.43e-002 1.58e-002 2.39e-003 4.90e-003 8.48e-003 1.10e-002 6.48e-003	6.30e-003 1.62e-004 1.29e-004 1.32e-004 1.60e-004 2.01e-005 0.00e+000 3.30e-005 7.60e-005 7.06e-005 5.64e-005	
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Log T50 min	Cv ft²/sec	Mv 1/tsf	k ft/day	Ca %
1 2 3 4 5 6 7 8 9 10 11	0.125 0.250 0.500 1.00 2.00 0.500 1.00 2.00 4.00 4.00 8.00	0.01153 0.01807 0.02720 0.03933 0.05514 0.05275 0.05030 0.05385 0.06233 0.08429 0.1266 0.1784	0.980 0.966 0.948 0.924 0.892 0.897 0.902 0.895 0.878 0.838 0.749	1.15 1.81 2.72 3.93 5.51 5.28 5.03 5.38 6.23 8.43 12.7 17.8	0.000 0.000 0.000 4.219 1.782 0.000 0.000 0.000 0.000 2.105 2.096	0.00e+000 0.00e+000 1.26e-006 2.90e-006 0.00e+000 0.00e+000 0.00e+000 0.00e+000 2.17e-006 1.95e-006	9.22e-002 5.23e-002 3.65e-002 2.43e-002 1.58e-002 2.39e-003 4.90e-003 7.10e-003 8.48e-003 1.10e-002 1.06e-002 6.48e-003	0.00e+000 0.00e+000 8.26e-005 1.24e-004 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 6.18e-005 3.41e-005	0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000 0.00e+000

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 1 of 12

Stress: 0.125 tsf



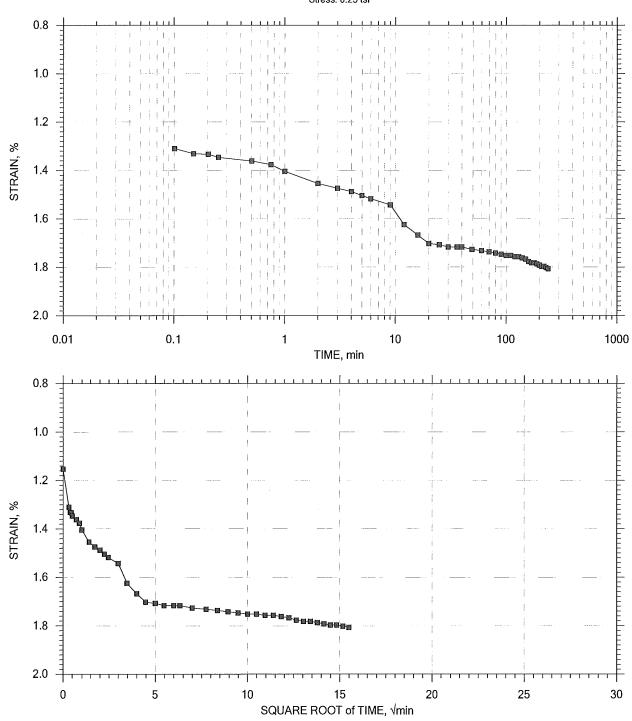
		Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-50	Tested By: md	Checked By: jdt		
		Sample No.: OT-1	Test Date: 01/10/14	Test No.: IP-5	
1	Geolesting	Depth: 19-21 ft	Sample Type: intact	Elevation:	
EAPRESS		Description: Moist, greenish gray clay			
		Remarks: System S			

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 12

Stress: 0.25 tsf



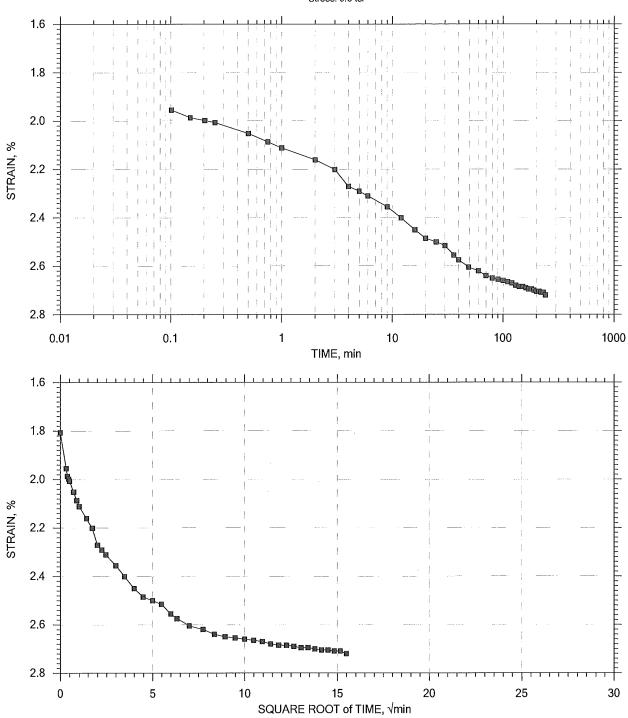
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-50	Tested By: md	Checked By: jdt
Cooloodino	Sample No.: OT-1	Test Date: 01/10/14	Test No.: IP-5
Geolesting	Depth: 19-21 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay		
	Remarks: System S		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 12

Stress: 0.5 tsf



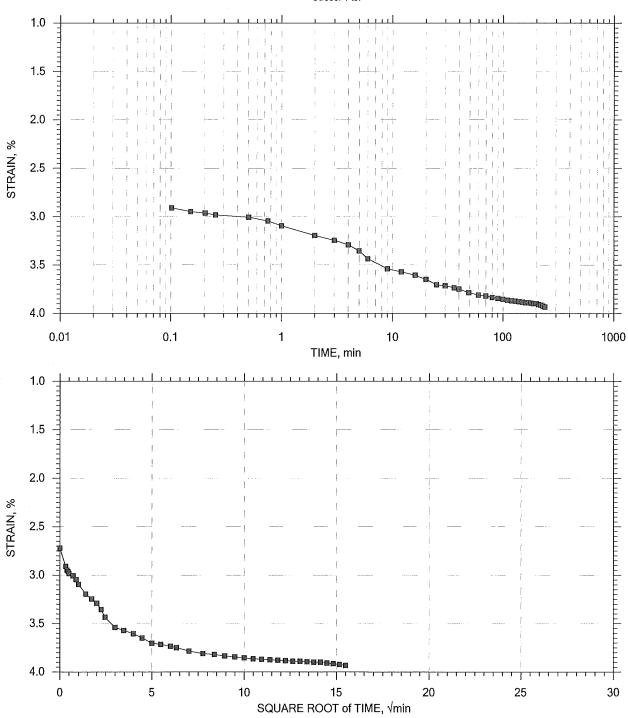
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-50	Tested By: md	Checked By: jdt
Contraction	Sample No.: OT-1	Test Date: 01/10/14	Test No.: IP-5
GeoTesting	Depth: 19-21 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay		
	Remarks: System S		
		- III A SANDAABUR INDAMININ	

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 12

Stress: 1 tsf

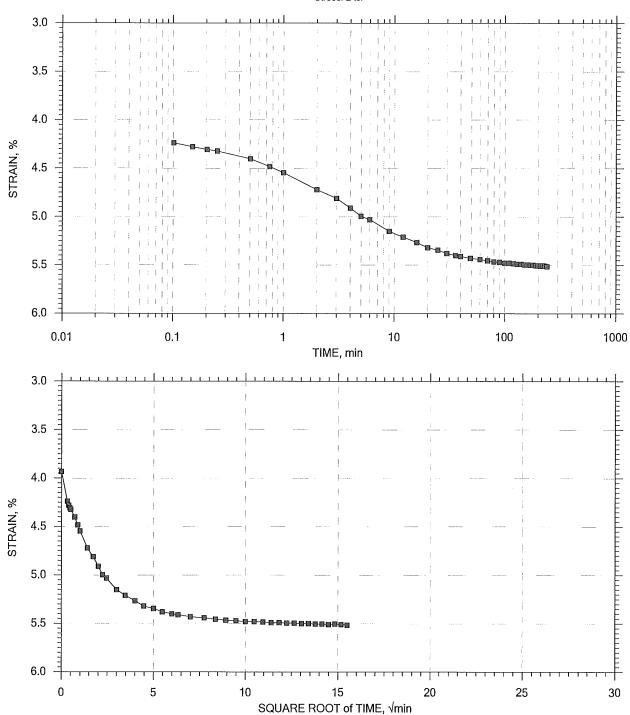


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-50	Tested By: md	Checked By: jdt
Costonia	Sample No.: OT-1	Test Date: 01/10/14	Test No.: IP-5
GeoTesting EXPRESS	Depth: 19-21 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System S		
		The second secon	

TIME CURVES

Constant Load Step 5 of 12





1	L
	Boring No.: B-50
Collection	Sample No.: OT-1
GeoTesting EXPRESS	Depth: 19-21 ft
	Description: Moist, greenish g

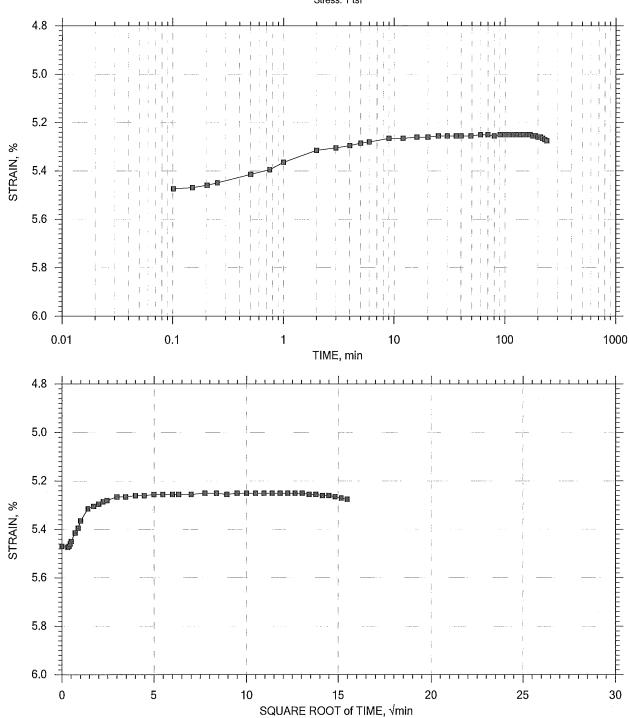
Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
Boring No.: B-50	Tested By: md	Checked By: jdt
Sample No.: OT-1	Test Date: 01/10/14	Test No.: IP-5
Depth: 19-21 ft	Sample Type: intact	Elevation:
Description: Moist, greenish gray clay		
Remarks: System S		
		The state of the s

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 12



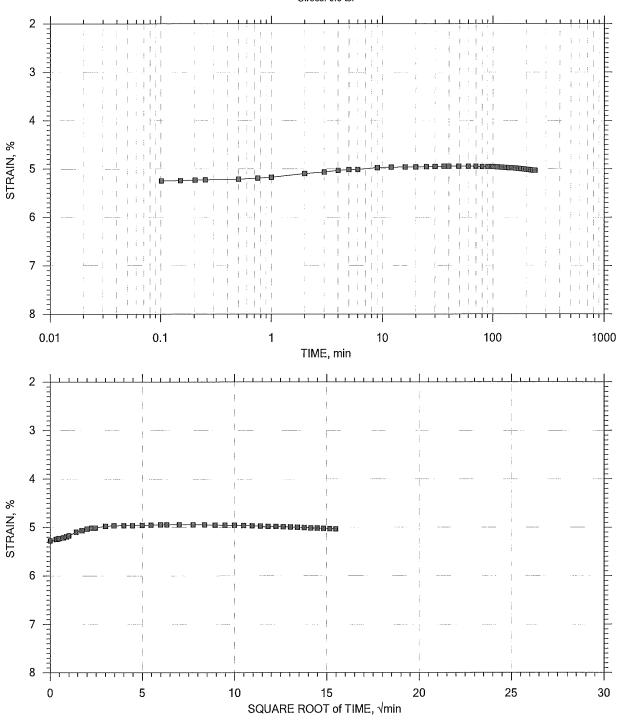


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: 8-50	Tested By: md	Checked By: jdt
Costostino	Sample No.: OT-1	Test Date: 01/10/14	Test No.: IP-5
GeoTesting EXPRESS	Depth: 19-21 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System S		

TIME CURVES

Constant Load Step 7 of 12

Stress: 0.5 tsf

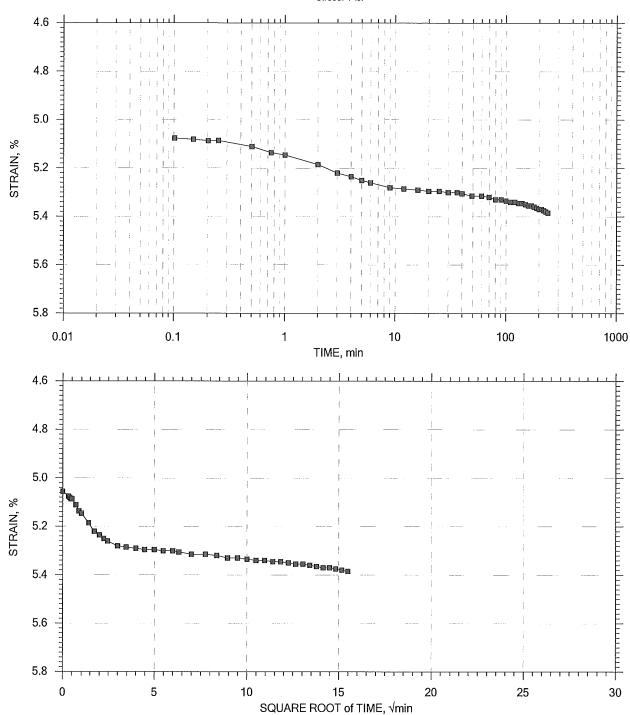


		Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
		Boring No.: B-50	Tested By: md	Checked By: jdt
		Sample No.: OT-1	Test Date: 01/10/14	Test No.: IP-5
Geor	esting	Sample No.: OT-1 Depth: 19-21 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay			
	Remarks: System S			

TIME CURVES

Constant Load Step 8 of 12





Contracting	
Geolesting EXPRESS	

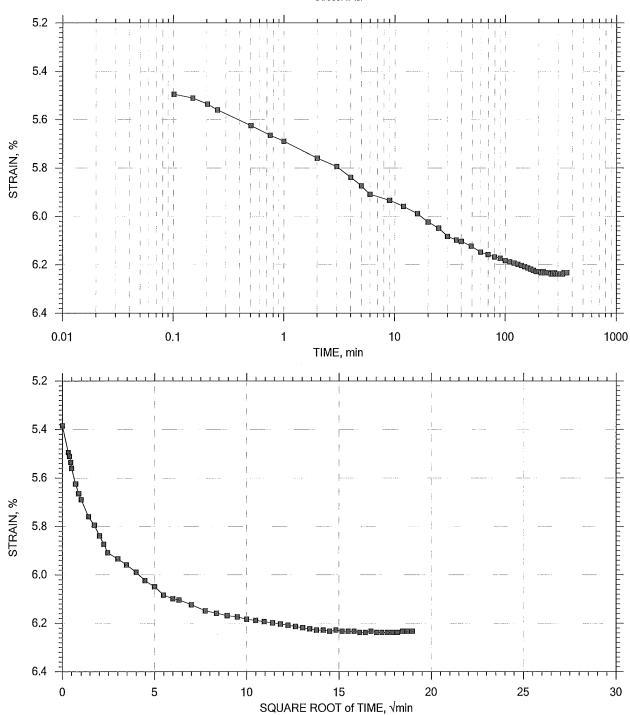
Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
Boring No.: B-50	Tested By: md	Checked By: jdt		
Sample No.: OT-1	Test Date: 01/10/14	Test No.: IP-5		
Depth: 19-21 ft	Sample Type: intact	Elevation:		
Description: Moist, greenish gray clay				
Remarks: System S				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 12





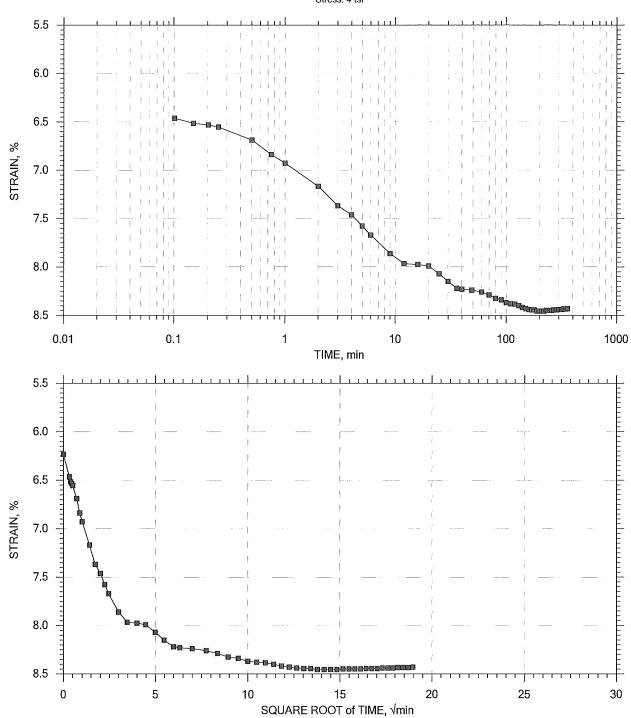
GeoTesting	
EXPRESS	

Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232			
Boring No.: B-50	Tested By: md	Checked By: jdt			
Sample No.: OT-1	Test Date: 01/10/14	Test No.: IP-5			
Depth: 19-21 ft	Sample Type; intact	Elevation:			
Description: Moist, greenish gray clay					
Remarks: System S					

TIME CURVES

Constant Load Step 10 of 12





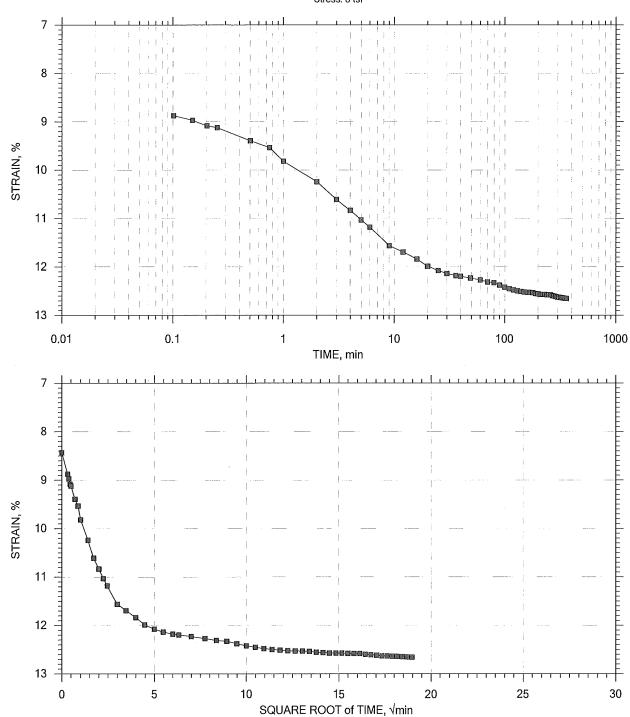
Collegia	
Geolesting Express	
EXPRESS	Ī

	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
ĺ	Boring No.: B-50	Tested By: md	Checked By: jdt		
9	Sample No.: OT-1	Test Date: 01/10/14	Test No.: IP-5		
	Depth: 19-21 ft	Sample Type: intact	Elevation:		
	Description: Moist, greenish gray clay				
	Remarks: System S				

TIME CURVES

Constant Load Step 11 of 12



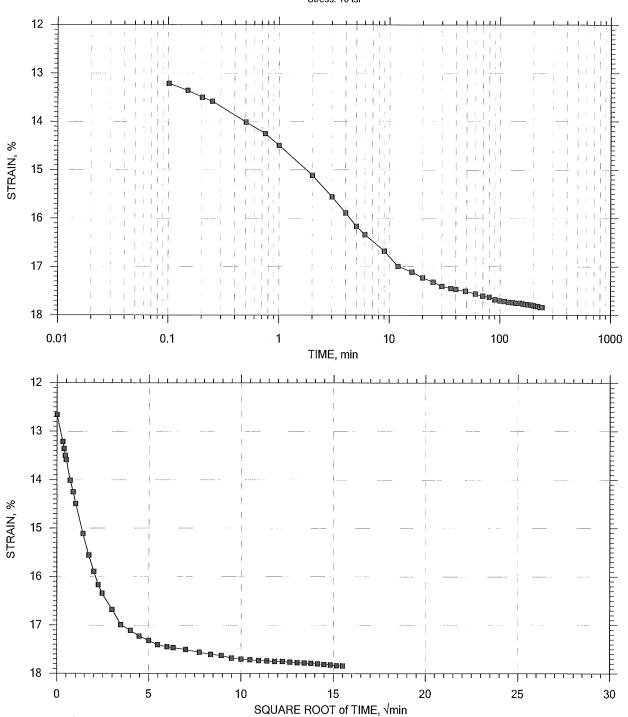


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-50	Tested By: md	Checked By: jdt	
Castantine	Sample No.: OT-1	Test Date: 01/10/14	Test No.: IP-5	
GeoTesting	Depth: 19-21 ft	Sample Type: intact	Elevation:	
EXPRESS	Description: Moist, greenish gray clay			
	Remarks: System S			
			1. 11.11.11.11.11.11.11.11.11.11.11.11.1	

TIME CURVES

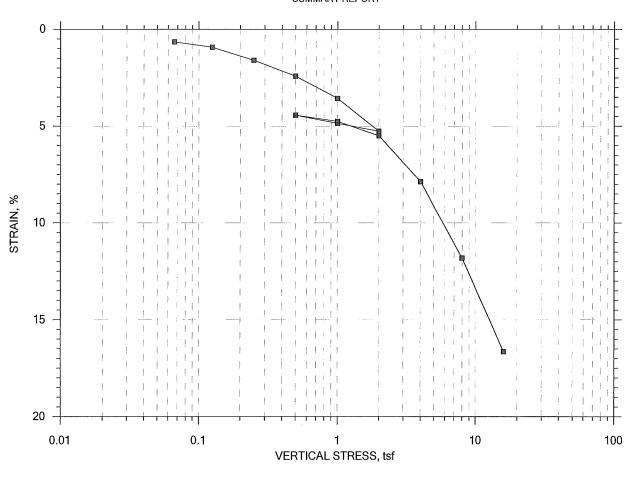
Constant Load Step 12 of 12

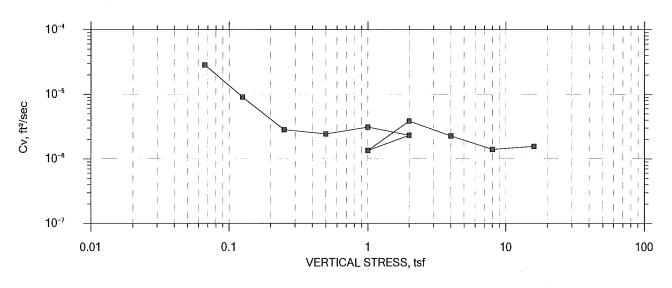
Stress: 16 tsf



	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-50	Tested By: md	Checked By: jdt	
Callactina	Sample No.: OT-1	Test Date: 01/10/14	Test No.: IP-5	
Geolesting	Depth: 19-21 ft	Sample Type: intact	Elevation:	
EAFRESS	Description: Moist, greenish gray clay			
	Remarks: System S			

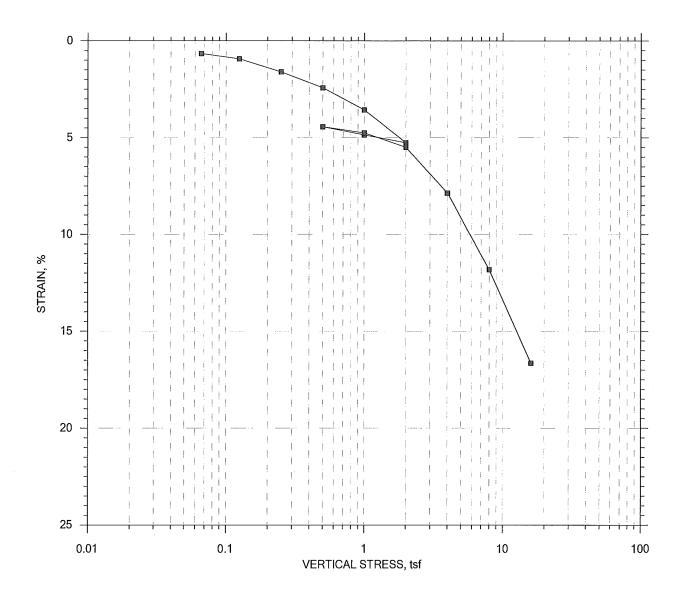
SUMMARY REPORT





	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-51	Tested By: md	Checked By: jdt
Castantina	Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6
Geolesting EXPRESS	Depth: 29-31 ft	Sample Type: intact	Elevation:
CAPRESS	Description: Moist, greenish gray clay		
	Remarks: System S		
	Displacement at End of Increment		

One-Dimensional Consolidation by ASTM D2435 - Method B SUMMARY REPORT



					Before Test	After Test
Current Vertical Effective Stress: Water Conf				Water Content, %	38.02	25.54
Preconsolidation Stress:			Dry Unit Weight, pcf	83.569	100.69	
Compression Ratio:			Saturation, %	99.43	100.00	
Diameter: 2.5 in		Height: 1 in		Void Ratio	1.05	0.70
LL:	PL:	Pl:	GS: 2.74			

	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-51	Tested By: md	Checked By: jdt	
Castantina	Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6	
Geolesting EXPRESS	Depth: 29-31 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay			
	Remarks: System S			
	Displacement at End of Increment			

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Silverline Boring No.: B-51 Sample No.: OT-1 Test No.: IP-6

Location: Chelsea, MA Tested By: md Test Date: 01/23/14 Sample Type: intact

Project No.: GTX-301232 Checked By: jdt Depth: 29-31 ft Elevation: ---

Soil Description: Moist, greenish gray clay Remarks: System ${\tt S}$

Estimated Specific Gravity: 2.74 Initial Void Ratio: 1.05 Final Void Ratio: 0.700 Liquid Limit: --Plastic Limit: ---Plasticity Index: ---- Specimen Diameter: 2.50 in Initial Height: 1.00 in Final Height: 0.83 in

	Before Co	onsolidation	After Consol	lidation
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID	13302	RING		11330
Wt. Container + Wet Soil, gm	240.67	257.57	244.13	145.35
Wt. Container + Dry Soil, gm	179.65	216.63	216.63	117.31
Wt. Container, gm	8.3800	108.95	108.95	7.5100
Wt. Dry Soil, gm	171.27	107.68	107.68	109.80
Water Content, %	35.63	38.02	25.54	25.54
Void Ratio		1.05	0.700	
Degree of Saturation, %		99.43	100.00	
Dry Unit Weight, pcf		83.569	100.69	

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method $\ensuremath{\mathtt{B}}$

Project: Silverline Boring No.: B-51 Sample No.: OT-1 Test No.: IP-6

Location: Chelsea, MA Tested By: md Test Date: 01/23/14 Sample Type: intact

Project No.: GTX-301232 Checked By: jdt Depth: 29-31 ft Elevation: ---

Soil Description: Moist, greenish gray clay Remarks: System ${\tt S}$

Displacement at End of Increment

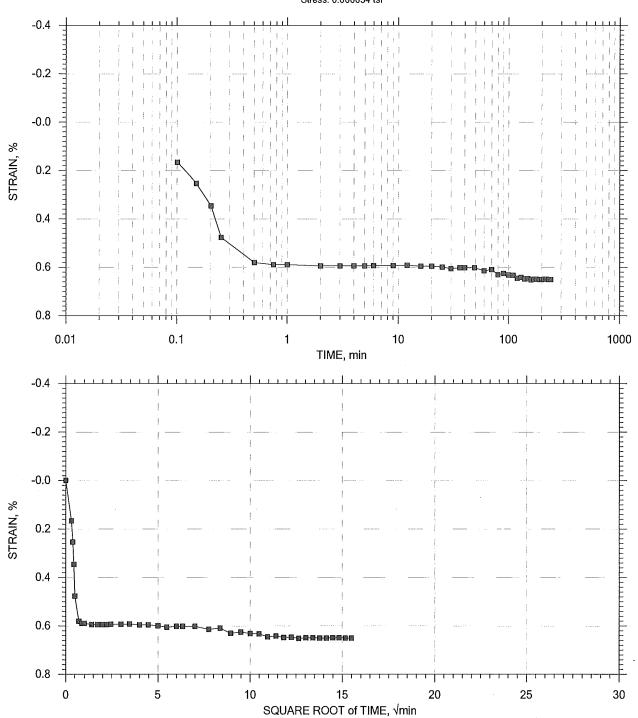
	Applied	Final	Void	Strain	Sq.Rt		.,	,	
	Stress	Displacement	Ratio	at End	T90	Cv	Mv	k St. ()	
	tsf	in		<u> </u>	min	ft²/sec	1/tsf	ft/day	
1	0.0666	0.006502	1.04	0.650	0.741	3.29e-005	9.76e-002	8.66e-003	
2	0.125	0.009246	1.03	0.925	3.750	6.44e-006	4.70e-002	8.17e-004	
	0.250	0.01597	1.02	1.60	9.244	2.59e-006	5.38e-002	3.75e-004	
4	0.500	0.02415	0.999	2.42	9.322	2.53e-006	3.27e-002	2.23e-004	
5 6 7	1.00	0.03563	0.976	3.56	8.162	2.83e-006	2.30e-002	1.75e-004	
6	2.00	0.05260	0.941	5.26	7.641	2.93e-006	1.70e-002	1.34e-004	
	1.00	0.04856	0.949	4.86	7.345	3.01e-006	4.04e-003	3.28e-005	
8	0.500	0.04431	0.958	4.43	30.002	7.44e-007	8.49e-003	1.70e-005	
9	1.00	0.04751	0.951	4.75	12.532	1.78e-006	6.40e-003	3.07e-005	
10	2.00	0.05494	0.936	5.49	6.175	3.58e-006	7.43e-003	7.17e-005	
11	4.00	0.07860	0.888	7.86	9.933	2.15e-006	1.18e-002	6.86e-005	
12	8.00	0.1182	0.807	11.8	11.286	1.77e-006	9.89e-003	4.72e-005	
13	16.0	0.1664	0.708	16.6	11.065	1.63e-006	6.03e-003	2.65e-005	
	Applied	Final	Void	Strain	Log				
	Stress	Displacement	Ratio	at End	T50	Cv	Mv	k	Ca
	tsf	in	Nacio	ac mid %	min	ft²/sec	1/tsf	ft/day	8
	651	111		· ·	MIII	10 / 500	17 031	re/ day	0
1	0.0666	0.006502	1.04	0.650	0.000	0.00e+000	9.76e-002	0.00e+000	0.00e+000
2	0,125	0.009246	1.03	0.925	0.000	0.00e+000	4.70e-002	0.00e+000	0.00e+000
3	0.250	0.01597	1.02	1.60	1.702	3.26e-006	5.38e-002	4.74e-004	0.00e+000
4	0.500	0.02415	0.999	2.42	2.242	2.44e-006	3.27e-002	2.16e-004	0.00e+000
5	1.00	0.03563	0.976	3.56	0.000	0.00e+000	2.30e-002	0.00e+000	0.00e+000
6	2.00	0.05260	0.941	5.26	2.797	1.86e-006	1.70e-002	8.52e-005	0.00e+000
7	1.00	0.04856	0.949	4.86	0.000	0.00e+000	4.04e-003	0.00e+000	0.00e+000
8	0.500	0.04431	0.958	4.43	0.000	0.00e+000	8.49e-003	0.00e+000	0.00e+000
9	1.00	0,04751	0.951	4.75	3.797	1.37e-006	6.40e-003	2.36e-005	0.00e+000
10	2.00	0.05494	0.936	5.49	1,268	4.05e-006	7.43e-003	8.11e-005	0.00e+000
11	2.00 4.00	0.05494 0.07860	0.936 0.888	5.49 7.86	2.322	2.14e-006	1.18e-002	6.82e-005	0.00e+000
	2.00	0.05494	0.936	5.49					

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Volume Step 1 of 13



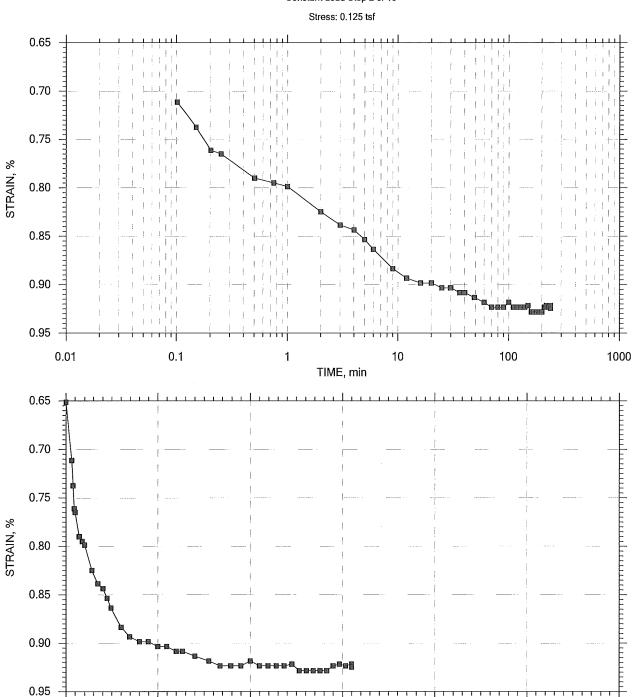


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-51	Tested By: md	Checked By: jdt	
Calledin	Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6	
Geolesting EXPRESS	Depth: 29-31 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay			
	Remarks: System S			

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 13



	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-51	Tested By: md	Checked By: jdt	
Castantina	Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6	
Geolesting EXPRESS	Depth: 29-31 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay			
	Remarks: System S			

10

0

5

15

SQUARE ROOT of TIME, √min

20

25

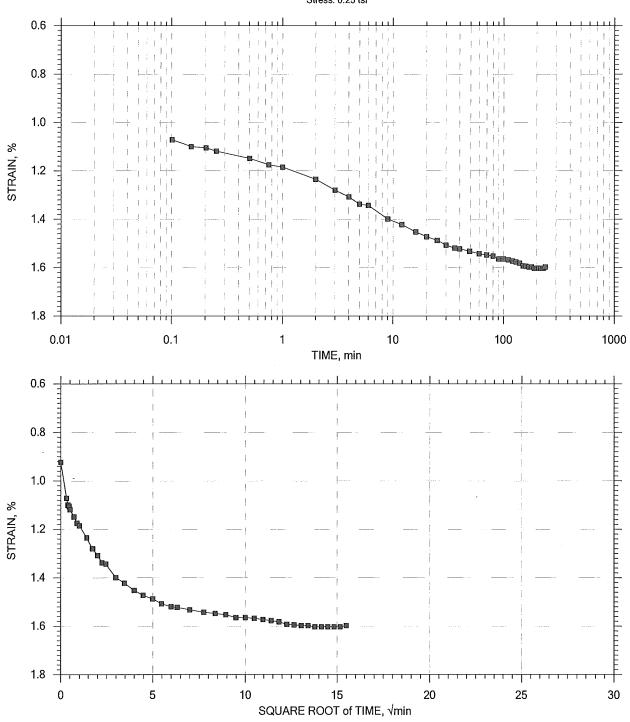
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One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 13

Stress: 0.25 tsf

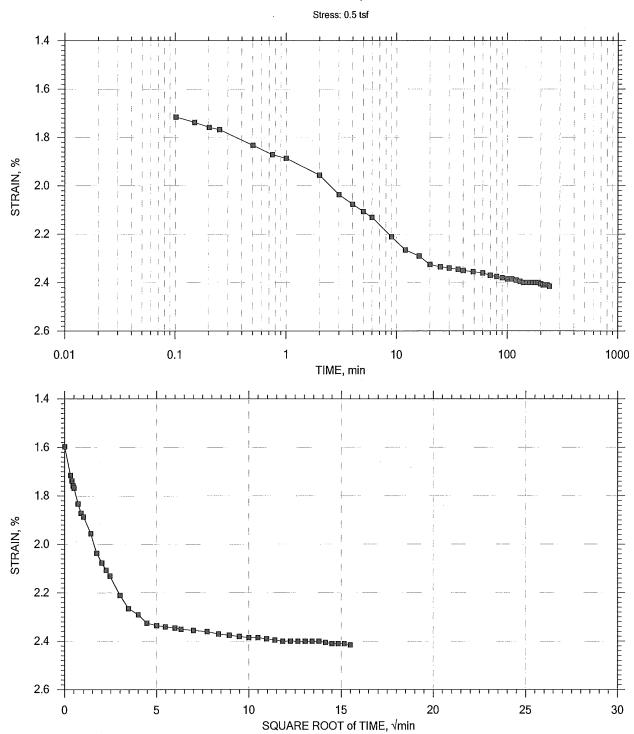


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-51	Tested By: md	Checked By: jdt		
Caclina	Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6		
Geolesting Express	Depth: 29-31 ft	Sample Type: intact	Elevation:		
	Description: Moist, greenish gray clay				
	Remarks: System S				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 13



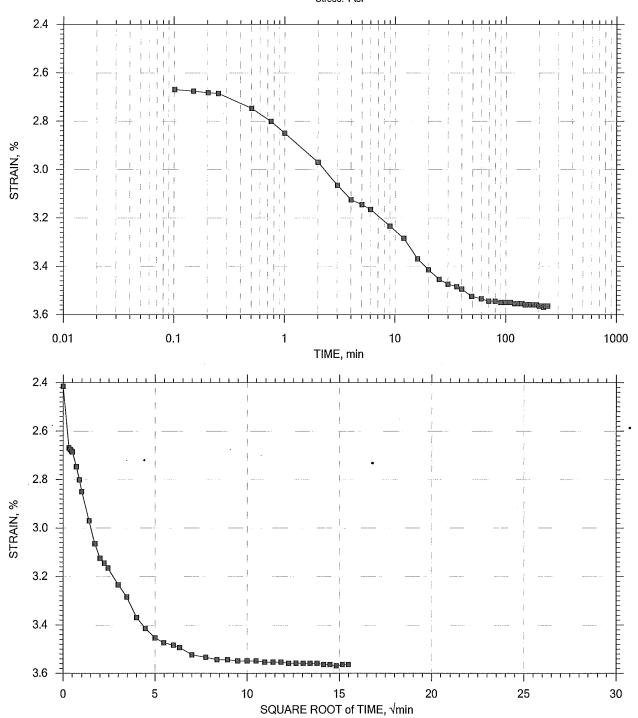
		Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-51	Tested By: md	Checked By: jdt			
		Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6		
	Geolesting EXPRESS	Depth: 29-31 ft	Sample Type: intact	Elevation:		
EXP		Description: Moist, greenish gray clay				
		Remarks: System S				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 13



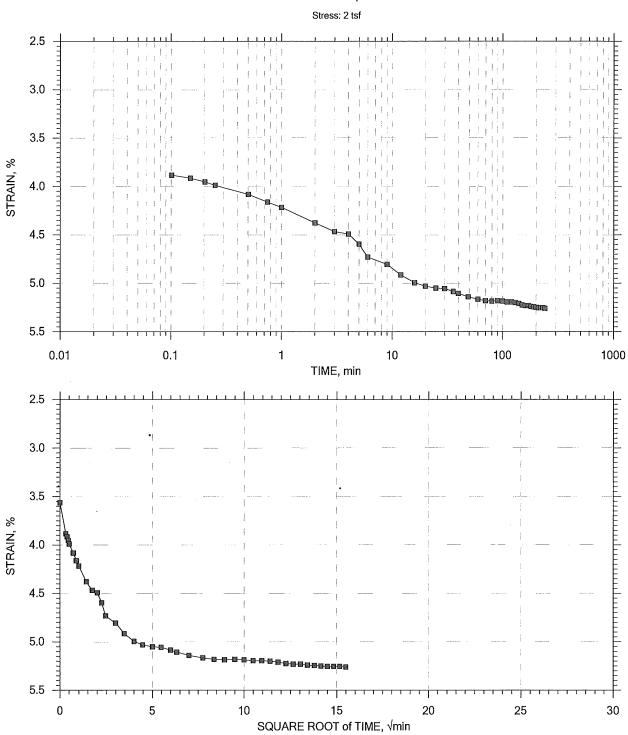


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-51	Tested By: md	Checked By: jdt
	Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6
GeoTesting EXPRESS	Depth: 29-31 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System S		

One-Dimensional Consolidation by ASTM D2435 - Method B



Constant Load Step 6 of 13



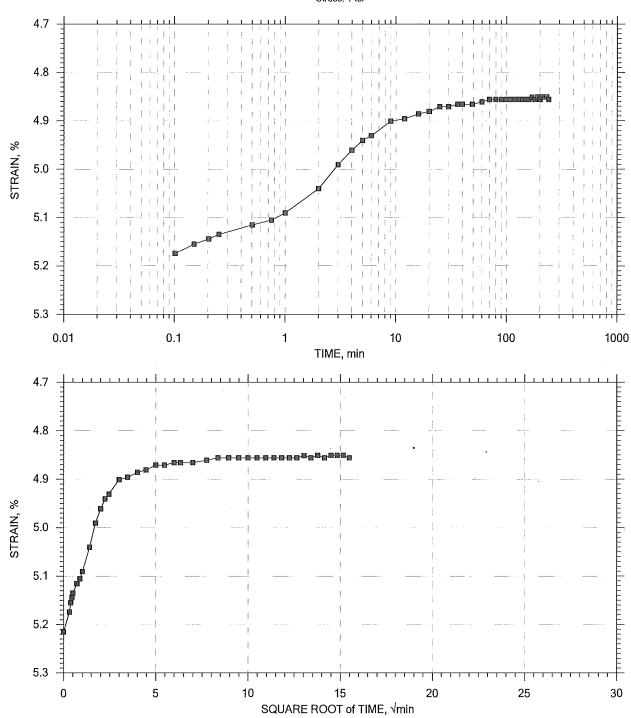
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-51	Tested By: md	Checked By: jdt		
Collection	Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6		
Geolesting Express	Depth: 29-31 ft	Sample Type: intact	Elevation:		
	Description: Moist, greenish gray clay				
	Remarks: System S				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 7 of 13





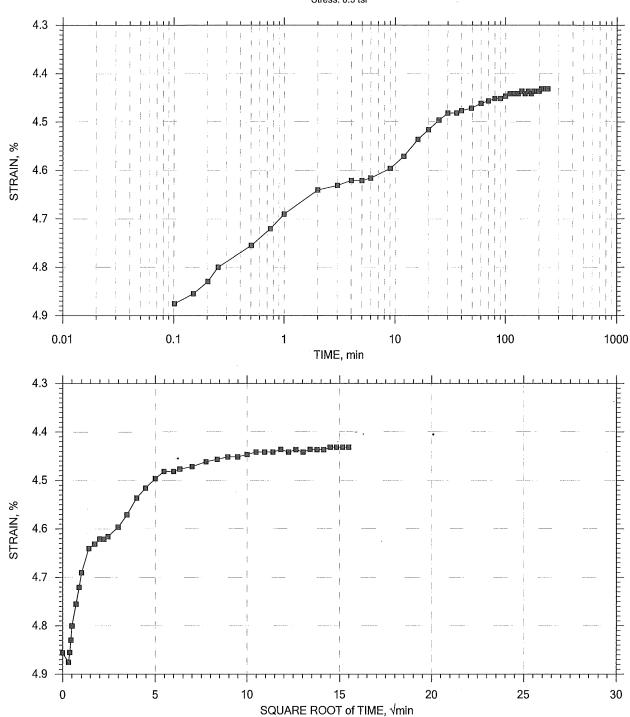
GeoTesting EXPRESS	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-51	Tested By: md	Checked By: jdt
	Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6
	Depth: 29-31 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System S		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 13





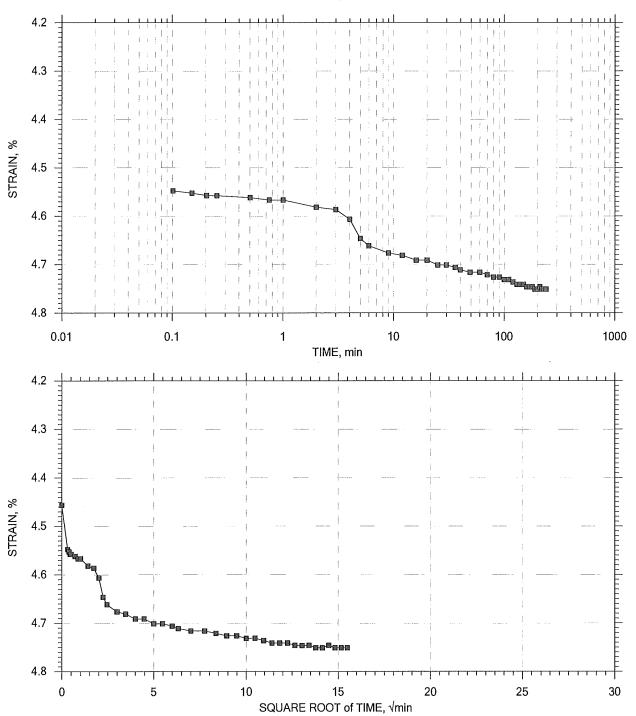
Geolesting EXPRESS	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-51	Tested By: md	Checked By: jdt	
	Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6	
	Depth: 29-31 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay			
	Remarks: System S			

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 13





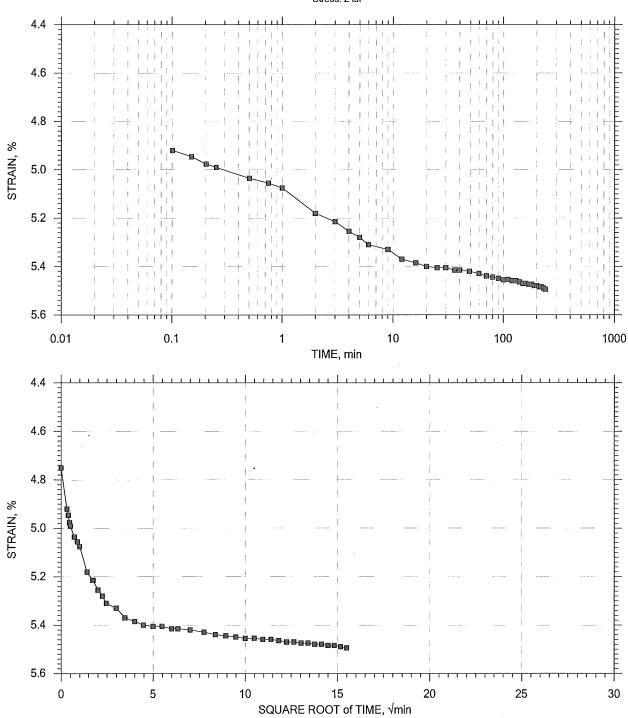
Geolesting EXPRESS	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-51	Tested By: md	Checked By: jdt
	Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6
	Depth: 29-31 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System S		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 13





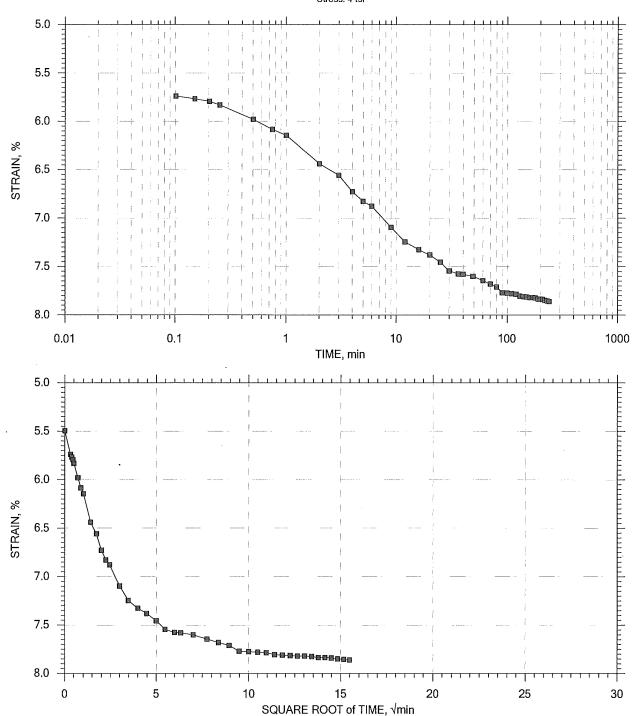
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-51	Tested By: md	Checked By: jdt
Collegation	Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6
GeoTesting EXPRESS	Depth: 29-31 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System S		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 13





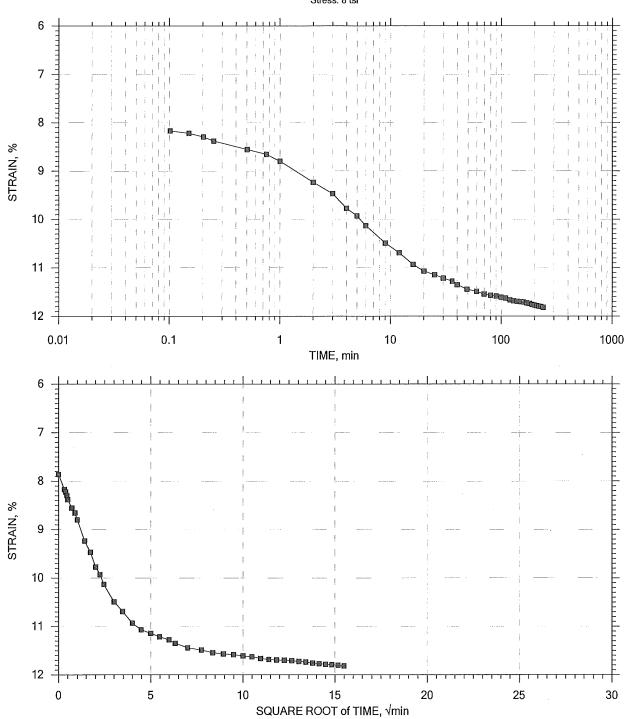
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-51	Tested By: md	Checked By: jdt		
Geolesting	Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6		
EXPRESS	Depth: 29-31 ft	Sample Type: intact	Elevation:		
	Description: Moist, greenish gray clay				
	Remarks: System S				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 13





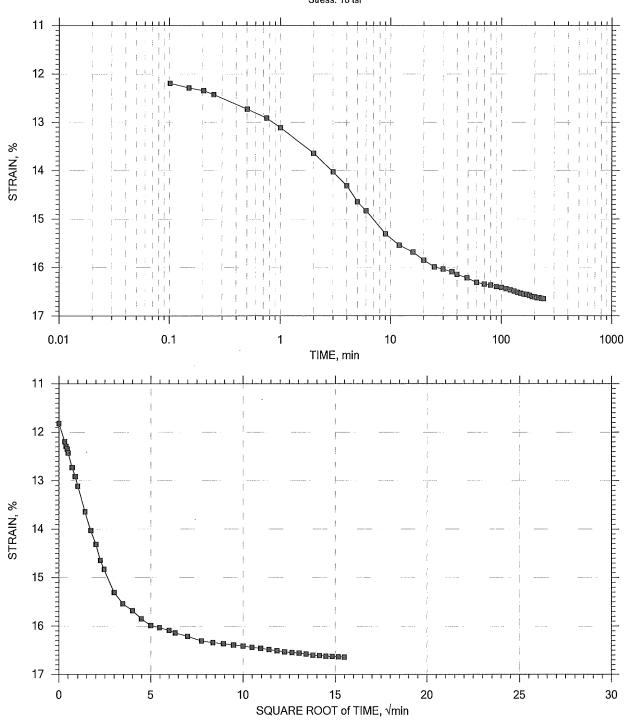
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-51	Tested By: md	Checked By: jdt
Coolontino	Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6
Geolesting EXPRESS	Depth: 29-31 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay		
	Remarks: System S		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 13

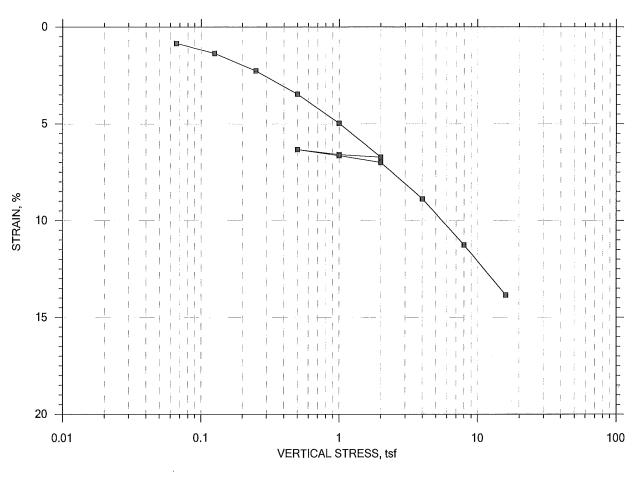
Stress: 16 tsf

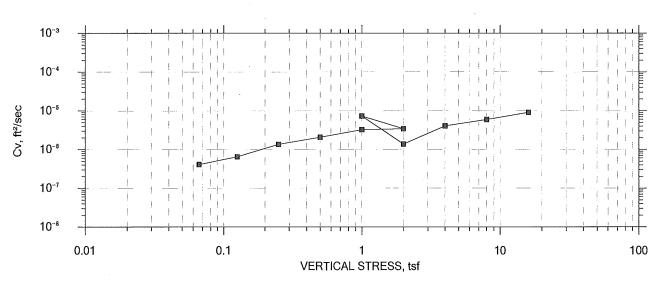


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-51	Tested By: md	Checked By: jdt
Callagina	Sample No.: OT-1	Test Date: 01/23/14	Test No.: IP-6
GeoTesting	Depth: 29-31 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay		
	Remarks: System S		

One-Dimensional Consolidation by ASTM D2435 - Method B

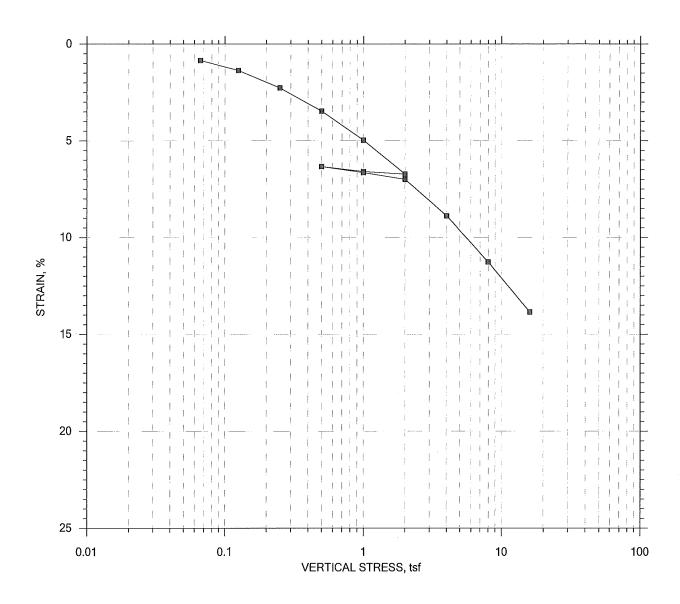






	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-51	Tested By: md	Checked By: jdt	
Callantina	Sample No.: OT-2	Test Date: 01/24/14	Test No.: IP-7	
Geolesting	Depth: 64-66 ft	Sample Type: intact	Elevation:	
EAPRESS	Description: Moist, greenish gray clay with sand			
	Remarks: System T			
	Displacement at End of Increment			

One-Dimensional Consolidation by ASTM D2435 - Method B SUMMARY REPORT



					Before Test	After Test
Current Vertical E	Current Vertical Effective Stress:			Water Content, %	23.65	16.99
Preconsolidation Stress:			Dry Unit Weight, pcf	102.77	116.78	
Compression Rati	Compression Ratio:			Saturation, %	97.41	100.00
Diameter: 2.5 in Height: 1 in		Void Ratio	0.67	0.47		
LL:	PL;	PI:	GS: 2.74			

	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-51	Tested By: md	Checked By: jdt		
Castantina	Sample No.: OT-2	Test Date: 01/24/14	Test No.: IP-7		
Geolesting EXPRESS	Depth: 64-66 ft	Sample Type: intact	Elevation:		
EXPRESS	Description: Moist, greenish gray clay with sand				
	Remarks: System T				
	Displacement at End of Increment				

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Silverline Boring No.: B-51 Sample No.: OT-2 Test No.: IP-7

Location: Chelsea, MA Tested By: md Test Date: 01/24/14 Sample Type: intact

Project No.: GTX-301232 Checked By: jdt Depth: 64-66 ft Elevation: ---

Soil Description: Moist, greenish gray clay with sand

Remarks: System T

Estimated Specific Gravity: 2.74 Initial Void Ratio: 0.666 Final Void Ratio: 0.466 Liquid Limit: ---Plastic Limit: ---Plasticity Index: --- Specimen Diameter: 2.50 in Initial Height: 1.00 in Final Height: 0.88 in

	Before Consolidation		After Conso	After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings	
Container ID	11252	RING		12367	
Wt. Container + Wet Soil, qm	358.26	273.72	264.90	162.94	
Wt. Container + Dry Soil, gm	277.48	242.40	242.40	140.47	
Wt. Container, gm	7.6000	109.98	109.98	8.2400	
Wt. Dry Soil, gm	269.88	132.42	132.42	132.23	
Water Content, %	29.93	23.65	16.99	16.99	
Void Ratio		0.666	0.466		
Degree of Saturation, %	275 EVS 414	97.41	100.00		
Dry Unit Weight, pcf	FF 772 F12	102.77	116.78	*** *** ***	

Note: Specific Gravity and Void Ratios are calculated assuming the degree of saturation equals 100% at the end of the test. Therefore, values may not represent actual values for the specimen.

One-Dimensional Consolidation by ASTM D2435 - Method B

Project: Silverline Boring No.: B-51 Sample No.: OT-2 Test No.: IP-7

Location: Chelsea, MA Tested By: md Test Date: 01/24/14 Sample Type: intact

Project No.: GTX-301232 Checked By: jdt Depth: 64-66 ft Elevation: ---

Soil Description: Moist, greenish gray clay with sand Remarks: System $\ensuremath{\mathtt{T}}$

Displacement at End of Increment

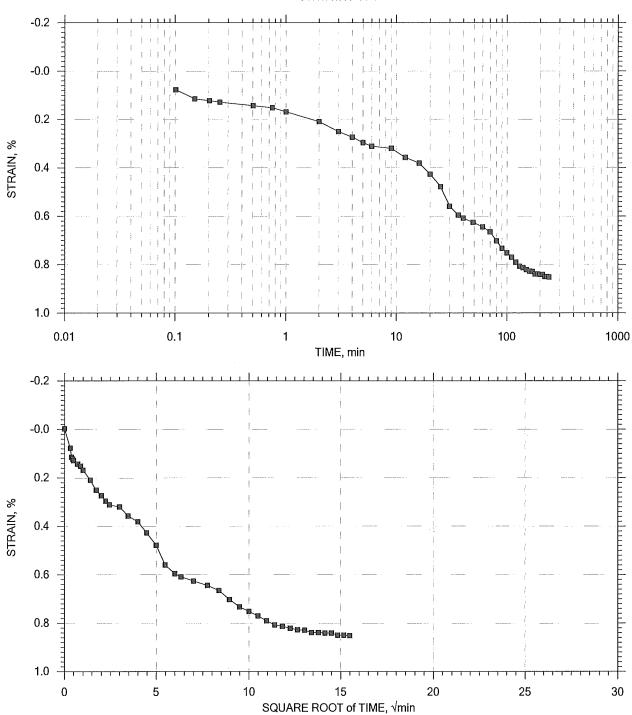
	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	Sq.Rt T90 min	Cv ft²/sec	Mv 1/tsf	k ft/day	
1	0.0664	0.008514	0.652	0.851	57.542	4.23e-007	1.28e-001	1.46e-004	
2	0.125	0.01367	0.643	1.37	38.812	6.18e-007	8.80e-002	1.47e-004	
3	0.250	0.02265	0.628	2.26	16.888	1.40e-006	7.18e-002	2.71e-004	
4	0.500	0.03469	0.608	3.47	10.737	2.16e-006	4.82e-002	2.80e-004	
5	1.00	0.04973	0.583	4.97	6.889	3.27e-006	3.01e-002	2.65e-004	
6	2.00	0.06723	0.554	6.72	6.905	3.15e-006	1.75e-002	1.49e-004	
7	1.00	0.06591	0.556	6.59	1.283	1.67e-005	1.32e-003	5.94e-005	
8	0.500	0.06331	0.560	6.33	0.892	2.41e-005	5.20e-003	3.38e-004	
9	1.00	0.06646	0.555	6.65	3.864	5.55e-006	6.31e-003	9.45e-005	
10	2.00	0.06998	0.549	7.00	20.418	1.04e-006	3.52e-003	9.91e-006	
11	4.00	0.08876	0.518	8.88	4.957	4.20e-006	9.39e-003	1.06e-004	
12	8.00	0.1126	0.478	11.3	2.953	6.72e-006	5.97e-003	1.08e-004	
13	16.0	0.1385	0.435	13.8	2.664	7.04e-006	3.23e-003	6.14e-005	
	Applied	Final	Void	Strain	Log				
	Stress	Displacement	Ratio	at End	T50	Cv	Mv	k	Ca
	tsf	in		%	min	ft²/sec	1/tsf	ft/day	%
						,	_,	,	
1	0.0664	0.008514	0.652	0.851	0.000	0.00e+000	1.28e-001	0.00e+000	0.00e+000
2	0.125	0.01367	0.643	1.37	0.000	0.00e+000	8.80e-002	0.00e+000	0.00e+000
3	0.250	0.02265	0.628	2.26	4.206	1.31e-006	7.18e-002	2.53e-004	0.00e+000
4	0.500	0.03469	0.608	3.47	2.571	2.09e-006	4.82e-002	2.72e-004	0.00e+000
5	1.00	0.04973	0.583	4.97	1.755	2.98e-006	3.01e-002	2.42e-004	0.00e+000
6	2.00	0.06723	0.554	6.72	1,487	3.40e-006	1.75e-002	1.60e-004	0.00e+000
7	1.00	0.06591	0.556	6.59	0.000	0.00e+000	1.32e-003	0.00e+000	0.00e+000
8	0.500	0.06331	0.560	6.33	0.000	0.00e+000	5.20e-003	0.00e+000	0.00e+000
9	1.00	0.06646	0.555	6.65	0.000	0.00e+000	6.31e-003	0.00e+000	0.00e+000
10	2.00	0.06998	0.549	7.00	0.000	0.00e+000	3.52e-003	0.00e+000	0.00e+000
11	4.00	0.08876	0.518	8.88	1.345	3.59e-006	9.39e-003	9.09e-005	0.00e+000
12	8.00	0.1126	0.478	11.3	0.910	5.07e-006	5.97e-003	8.16e-005	0.00e+000
13	16.0	0.1385	0.435	13.8	0.426	1.02e-005	3.23e-003	8.91e-005	0.00e+000

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Volume Step 1 of 13





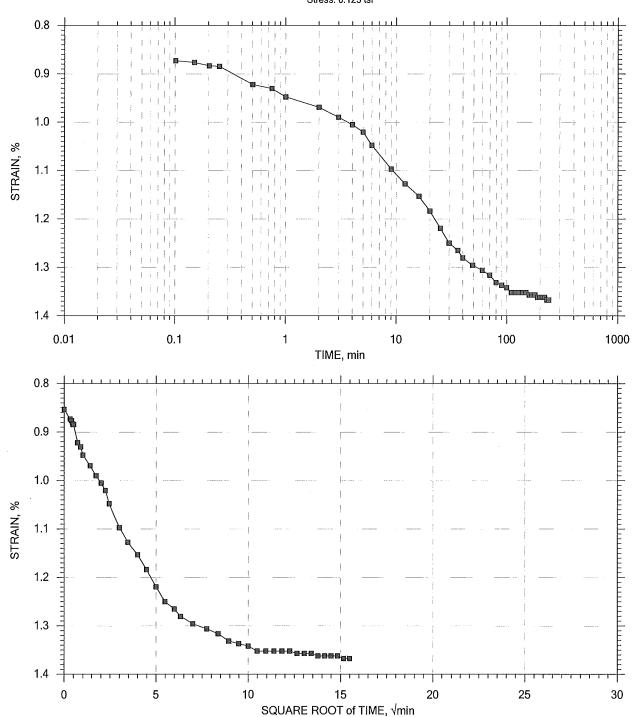
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-51	Tested By: md	Checked By: jdt	
Callagina	Sample No.: OT-2	Test Date: 01/24/14	Test No.: IP-7	
GeoTesting EXPRESS	Depth: 64-66 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay with sand			
	Remarks: System T			

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 2 of 13

Stress: 0.125 tsf



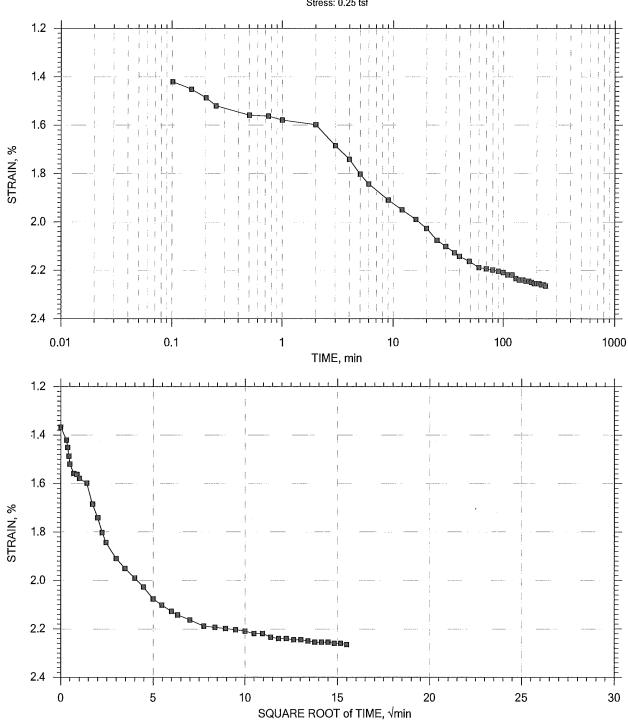
		Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-51	Tested By: md	Checked By: jdt		
	Sample No.: OT-2	Test Date: 01/24/14	Test No.: IP-7		
ľ	Geolesting EXPRESS	Depth: 64-66 ft	Sample Type: intact	Elevation:	
EAPRESS	Description: Moist, greenish gray clay with sand				
	Remarks: System T				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 3 of 13

Stress: 0.25 tsf

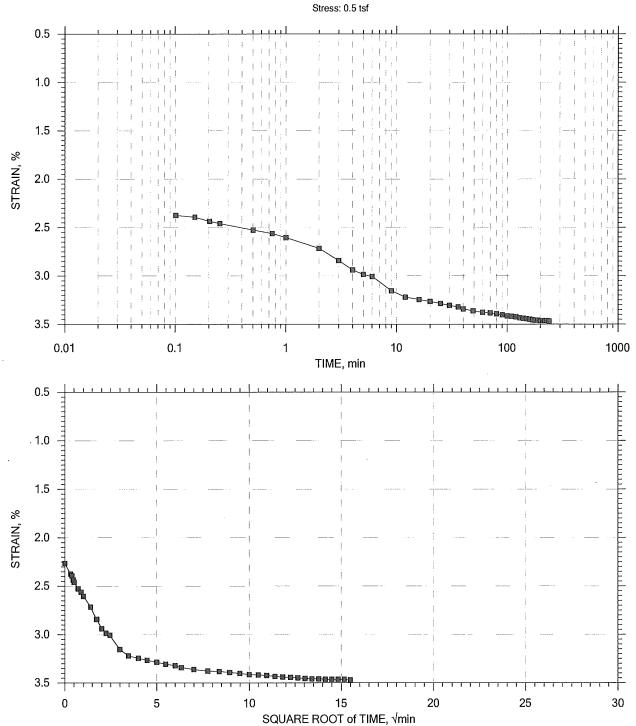


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-51	Tested By: md	Checked By: jdt
Castantina	Sample No.: OT-2	Test Date: 01/24/14	Test No.: IP-7
GeoTesting Express	Depth: 64-66 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay with sand		
	Remarks: System T		

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 4 of 13

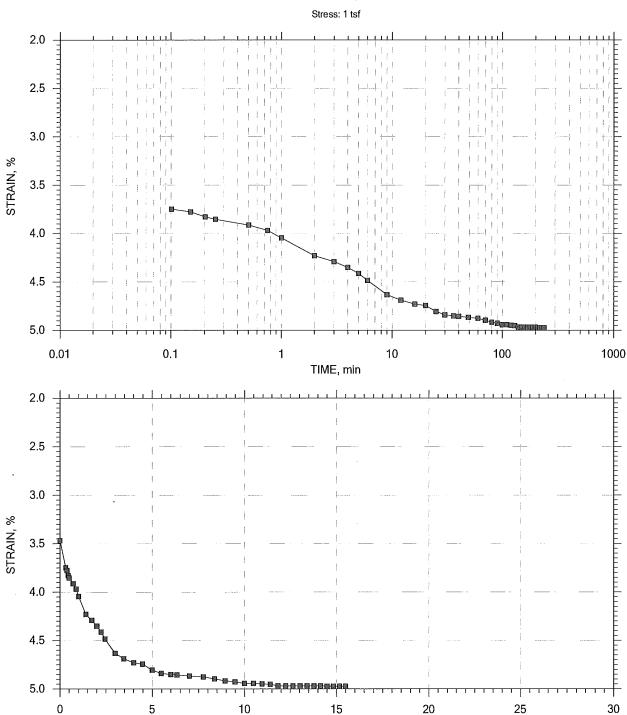


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-51	Tested By: md	Checked By: jdt	
Castantina	Sample No.: OT-2	Test Date: 01/24/14	Test No.: IP-7	
Geolesting EXPRESS	Depth: 64-66 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay with sand			
	Remarks: System T			

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 5 of 13



	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-51	Tested By: md	Checked By: jdt	
GeoTesting EXPRESS	Sample No.: OT-2	Test Date: 01/24/14	Test No.: IP-7	
	Depth: 64-66 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay with sand			
	Remarks: System T			

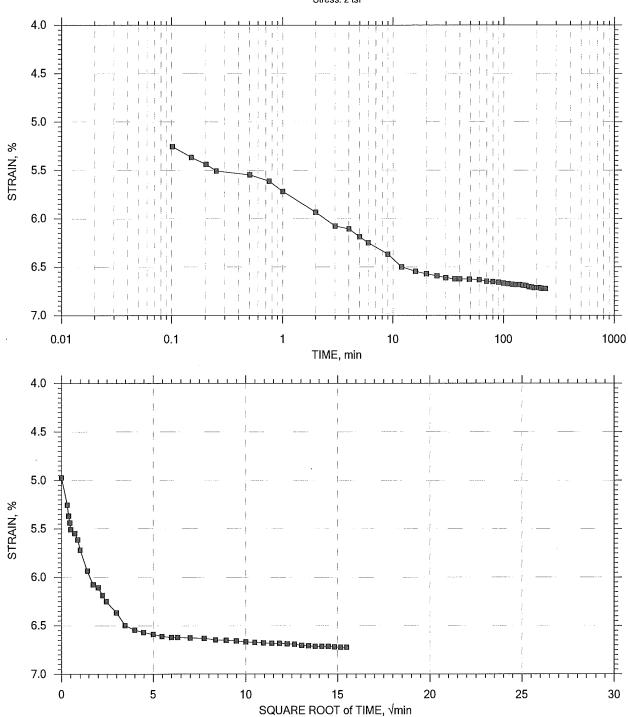
SQUARE ROOT of TIME, √min

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 6 of 13

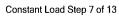


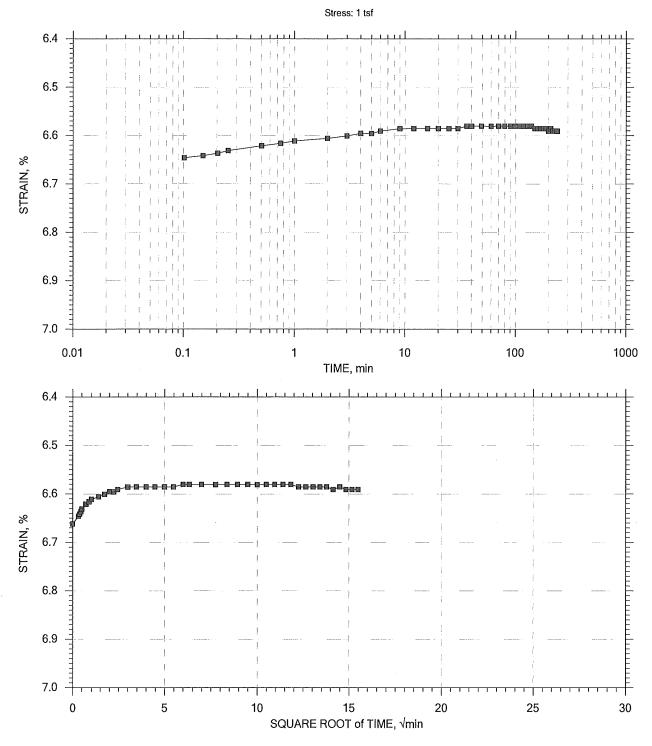


	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-51	Tested By: md	Checked By: jdt	
Cartina	Sample No.: OT-2	Test Date: 01/24/14	Test No.: IP-7	
Geolesting	Depth: 64-66 ft	Sample Type: intact	Elevation:	
EXPRESS	Description: Moist, greenish gray clay with sand			
	Remarks; System T			

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES





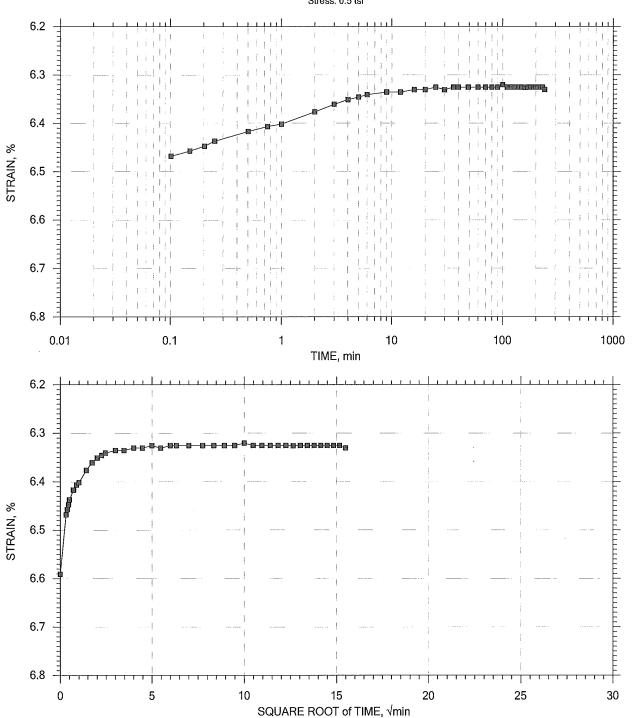
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232		
	Boring No.: B-51	Tested By: md	Checked By: jdt		
Gastachine	Sample No.: OT-2	Test Date: 01/24/14	Test No.: IP-7		
Geolesting EXPRESS	Depth: 64-66 ft	Sample Type: intact	Elevation:		
EXPRESS	Description: Moist, greenish gray clay with sand				
	Remarks: System T				

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 8 of 13

Stress: 0.5 tsf



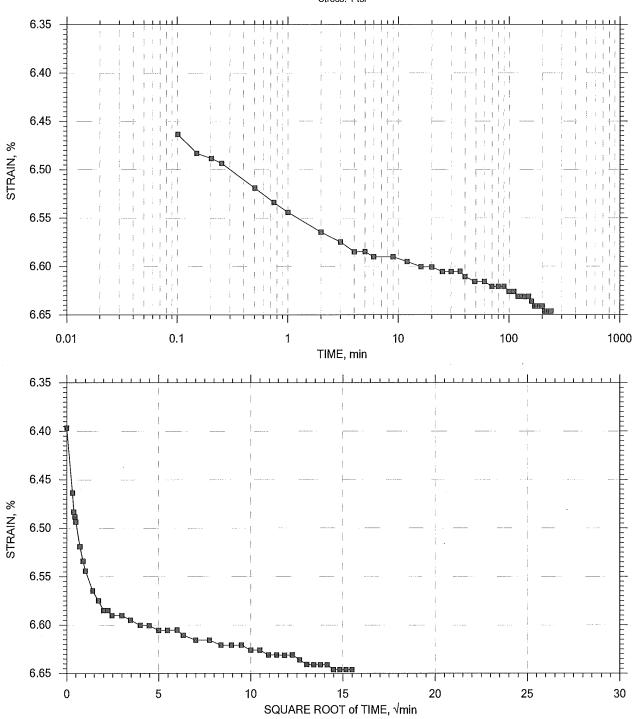
Geolesting EXPRESS	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
	Boring No.: B-51	Tested By: md	Checked By: jdt
	Sample No.: OT-2	Test Date: 01/24/14	Test No.: IP-7
	Depth: 64-66 ft	Sample Type: intact	Elevation:
	Description: Moist, greenish gray clay with sand		
	Remarks: System T	1.1.0.00	

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 9 of 13





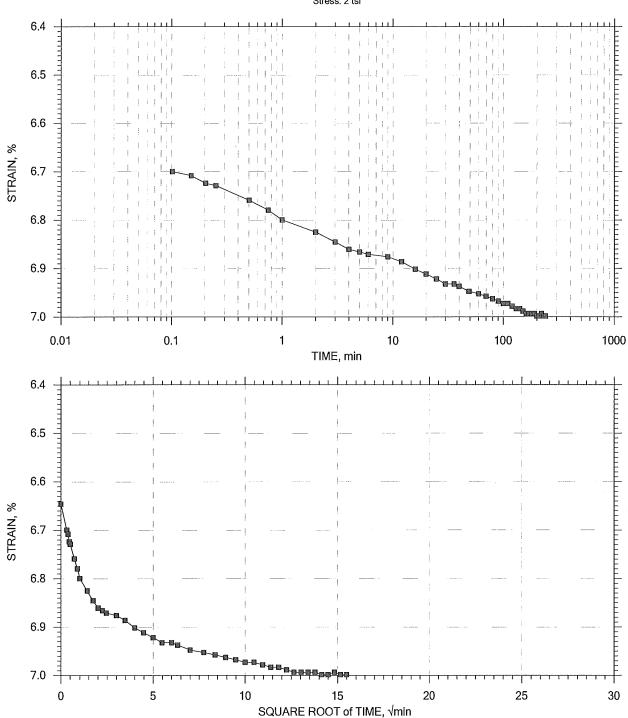
	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
		Boring No.: B-51	Tested By: md	Checked By: jdt
Cast	Codinon	Sample No.: OT-2	Test Date: 01/24/14	Test No.: IP-7
	lesting	Depth: 64-66 ft	Sample Type: intact	Elevation:
EXPRESS	Description: Moist, greenish gray clay with sand			
	Remarks: System T			

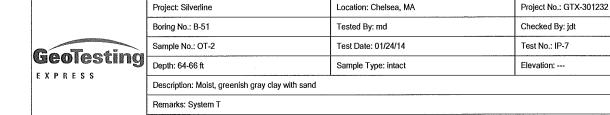
One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 10 of 13





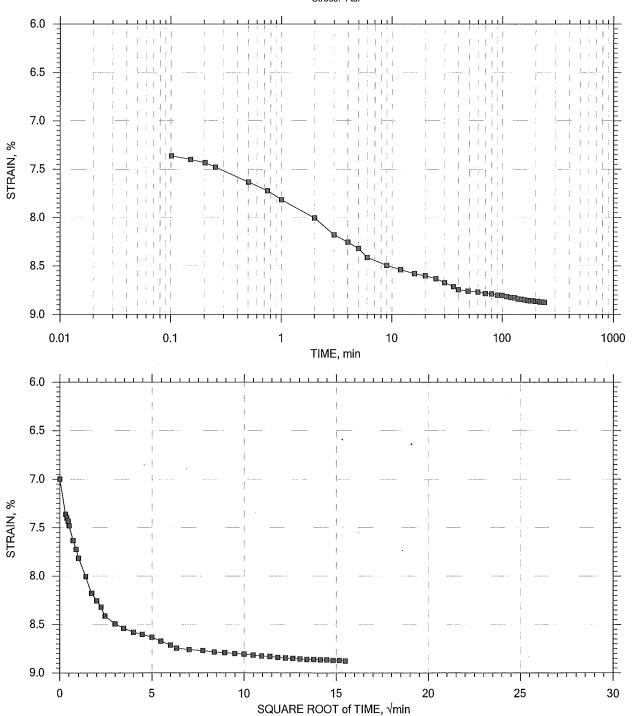


One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 11 of 13





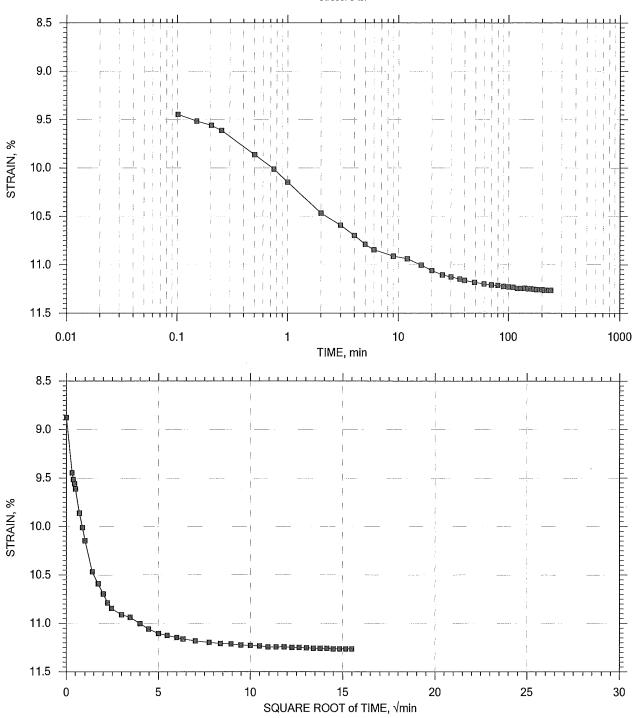
Geolesting EXPRESS	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-51	Tested By: md	Checked By: jdt	
	Sample No.: OT-2	Test Date: 01/24/14	Test No.: IP-7	
	Depth: 64-66 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay with sand			
	Remarks: System T			

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 12 of 13





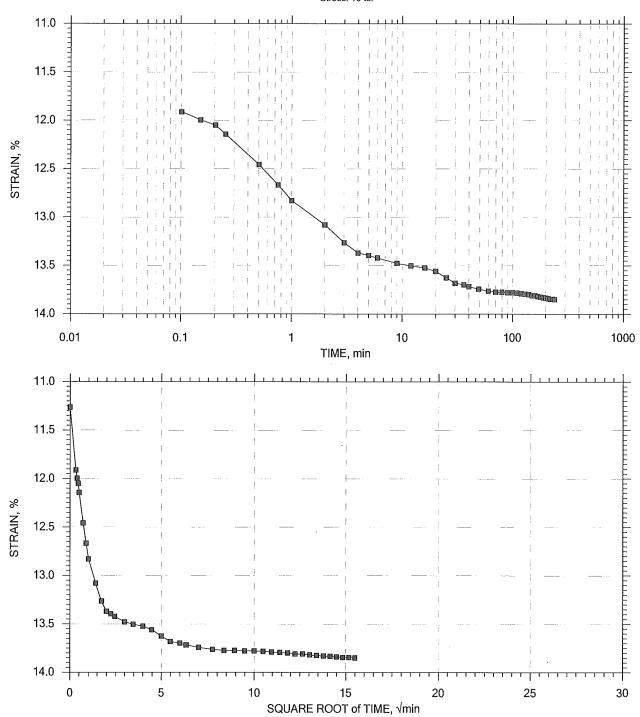
Geolesting Express	Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
	Boring No.: B-51	Tested By: md	Checked By: jdt	
	Sample No.: OT-2	Test Date: 01/24/14	Test No.: IP-7	
	Depth: 64-66 ft	Sample Type: intact	Elevation:	
	Description: Moist, greenish gray clay with sand			
	Remarks: System T			

One-Dimensional Consolidation by ASTM D2435 - Method B

TIME CURVES

Constant Load Step 13 of 13





	ı
Castonia	;
Geolesting EXPRESS	ı
CAPACSS	ı

Project: Silverline Location: Chelsea, MA		Project No.: GTX-301232
Boring No.: B-51	Tested By: md	Checked By: jdt
Sample No.: OT-2	Test Date: 01/24/14	Test No.: IP-7
Depth: 64-66 ft Sample Type: intact		Elevation:
Description: Moist, greenish gray clay	with sand	
Remarks: System T		



 Client:
 AECOM

 Project:
 Silverline

 Location:
 Chelsea, MA

 Project No:
 GTX-301232

Boring ID: B-3 Sample Type: bucket Tested By: cwd Sample ID: Bulk Test Date: 12/27/13 Checked By: jdt

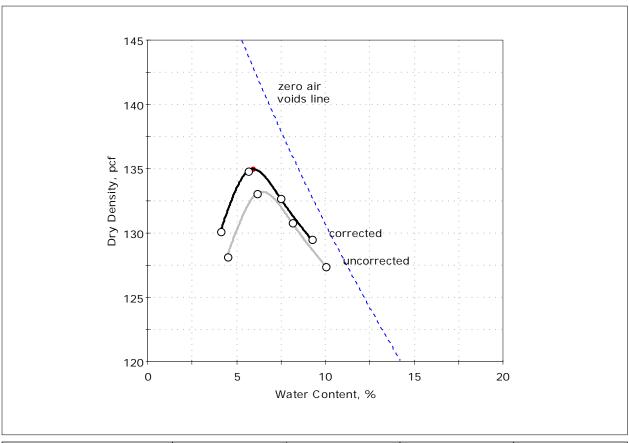
Depth: 0-4 ft Test Id: 285898

Test Comment: ---

Sample Description: Moist, very dark gray sand with silt and gravel

Sample Comment: ---

Compaction Report - ASTM D1557



Data Points	Point 1	Point 2	Point 3	Point 4
Dry density, pcf	128.1	133.1	130.8	127.5
Moisture Content, %	4.5	6.1	8.1	10.0

Method : C Preparation : DRY

As received Moisture : 6 %

Rammer : Manual

Zero voids line based on assumed specific gravity of 2.65

Maximum Dry Density= 133.0 pcf Optimum Moisture= 6.5 %

Oversize Correction (8.0% > 3/4 inch Sieve)

Corrected Maximum Dry Density= 135.0 pcf Corrected Optimum Moisture= 6.0 %

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Client: AECOM
Project: Silverline
Location: Chelsea, MA Project No: GTX-301232

Boring ID: B-3 Sample Type: bucket Tested By: cwd Sample ID: Bulk Test Date: 12/27/13 Checked By: jdt

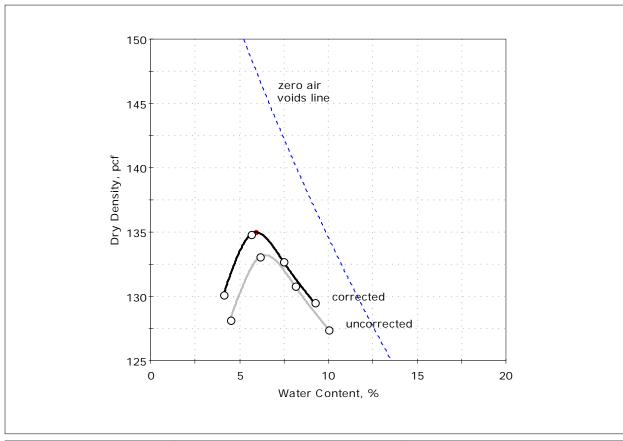
Depth: 0-4 ft Test Id: 285898

Test Comment: ---

Sample Description: Moist, very dark gray sand with silt and gravel

Sample Comment: ---

Compaction Report - ASTM D1557



Data Points	Point 1	Point 2	Point 3	Point 4
Dry density, pcf	128.1	133.1	130.8	127.5
Moisture Content, %	4.5	6.1	8.1	10.0

Method : C Preparation : DRY

As received Moisture : 6 %

Rammer : Manual

Zero voids line based on assumed specific gravity of 2.75

Maximum Dry Density= 133.0 pcf Optimum Moisture= 6.5 %

Oversize Correction (8.0% > 3/4 inch Sieve)

Corrected Maximum Dry Density= 135.0 pcf Corrected Optimum Moisture= 6.0 %

printed 1/23/2014 10:09:41 AM



Client: AECOM
Project: Silverline
Location: Chelsea, MA

Location:Chelsea, MAProject No:GTX-301232Boring ID:B-21Sample Type:bagTested By:cwdSample ID:BulkTest Date:01/14/14Checked By:jdt

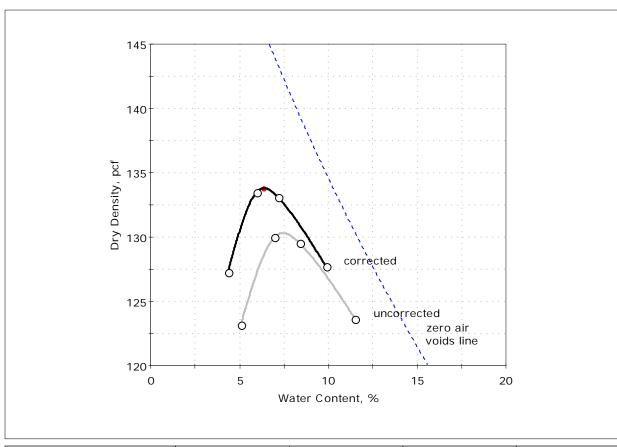
Depth: 0-10 ft Test Id: 286927

Test Comment: ---

Sample Description: Moist, very dark gray silty sand with gravel

Sample Comment: ---

Compaction Report - ASTM D1557



Data Points	Point 1	Point 2	Point 3	Point 4
Dry density, pcf	123.2	130.0	129.5	123.6
Moisture Content, %	5.1	7.0	8.4	11.5

Method : C Preparation : DRY

As received Moisture: 12 %

Rammer : Manual

Zero voids line based on assumed specific gravity of 2.75

Maximum Dry Density= 130.5 pcf Optimum Moisture= 7.5 %

Oversize Correction (14.3% > 3/4 inch Sieve)

Corrected Maximum Dry Density= 134.0 pcf

Corrected Optimum Moisture= 6.5 % Assumed Average Bulk Specific Gravity = 2.55

printed 1/23/2014 10:49:44 AM



Client: AECOM
Project: Silverline
Location: Chelsea, MA Project No: GTX-301232

Boring ID: B-26 Sample Type: bucket Tested By: cwd Sample ID: Bulk (B26A / B26) Test Date: 02/10/14 Checked By: jdt

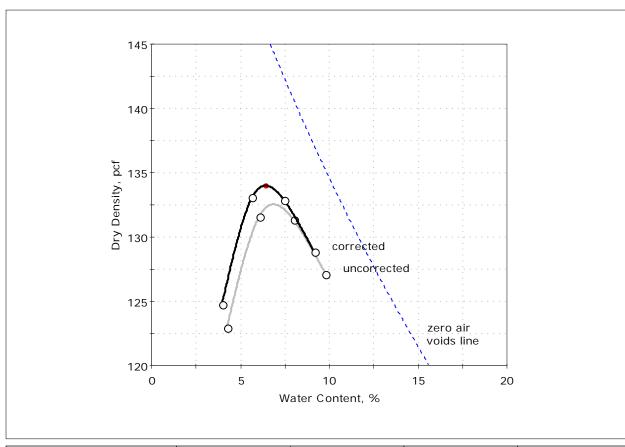
Depth: 1-4 ft Test Id: 288470

Test Comment: ---

Sample Description: Moist, very dark gray sand with silt and gravel

Sample Comment: ---

Compaction Report - ASTM D1557



Data Points	Point 1	Point 2	Point 3	Point 4
Dry density, pcf	123.0	131.6	131.3	127.1
Moisture Content, %	4.2	6.1	8.0	9.8

Method : C Preparation : DRY

As received Moisture : 8 %

Rammer : Manual

Zero voids line based on assumed specific gravity of 2.75

Maximum Dry Density= 132.5 pcf Optimum Moisture= 7.0 %

Oversize Correction (6.5% > 3/4 inch Sieve)

Corrected Maximum Dry Density= 134.0 pcf Corrected Optimum Moisture= 6.5 %

printed 2/13/2014 8:19:38 AM



Client: AECOM
Project: Silverline
Location: Chelsea, MA

Boring ID: B-30 Sample Type: bucket Tested By: Sample ID: Bulk (B31 / B32) Test Date: 02/10/14 Checked By:

Project No:

GTX-301232

jdt

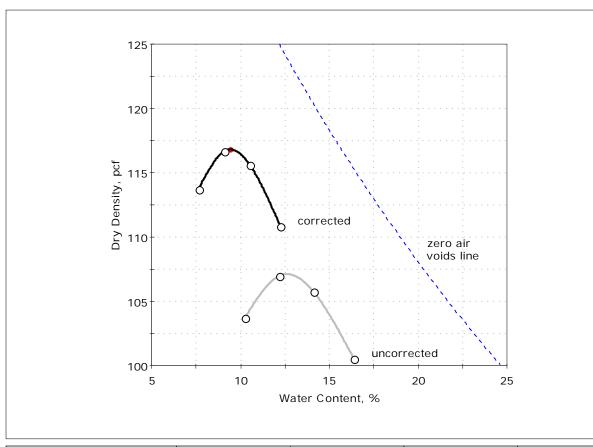
Depth: 1-3 ft Test Id: 288471

Test Comment: --

Sample Description: Moist, black silty gravel with sand

Sample Comment: ---

Compaction Report - ASTM D1557



Data Points	Point 1	Point 2	Point 3	Point 4
Dry density, pcf	103.7	107.0	105.8	100.5
Moisture Content, %	10.2	12.2	14.1	16.4

Method : C Preparation : DRY

As received Moisture: 21 %

Rammer : Manual

Zero voids line based on assumed specific gravity of 2.65

Maximum Dry Density= 107.0 pcf Optimum Moisture= 12.5 %

Oversize Correction (25.3% > 3/4 inch Sieve)

Corrected Maximum Dry Density= 117.0 pcf Corrected Optimum Moisture= 9.5 %

printed 2/13/2014 8:20:53 AM



Client: AECOM
Project: Silverline
Location: Chelsea, MA
Project No: GTX-301232

Boring ID: B-37 Sample Type: bag Tested By: cwd Sample ID: Bulk Test Date: 01/13/14 Checked By: jdt

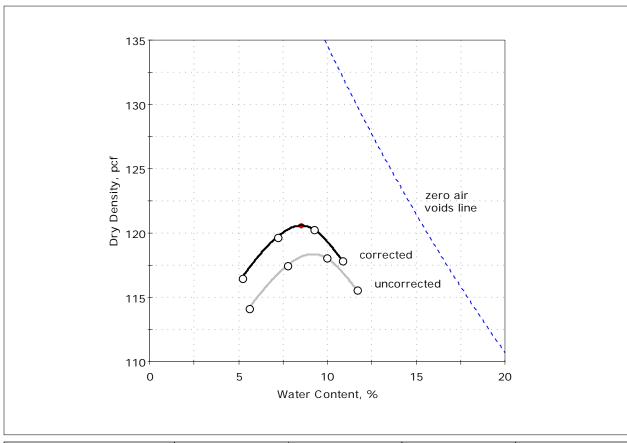
Depth: 1-5 ft Test Id: 286926

Test Comment: ---

Sample Description: Moist, dark grayish brown sand with silt and gravel

Sample Comment: ---

Compaction Report - ASTM D1557



Data Points	Point 1	Point 2	Point 3	Point 4
Dry density, pcf	114.2	117.5	118.1	115.6
Moisture Content, %	5.6	7.8	9.9	11.7

Method : C Preparation : DRY

As received Moisture: 18 %

Rammer : Manual

Zero voids line based on assumed specific gravity of 2.75

Maximum Dry Density= 118.5 pcf Optimum Moisture= 9.0 %

Oversize Correction (7.2% > 3/4 inch Sieve)

Corrected Maximum Dry Density= 120.5 pcf

Corrected Optimum Moisture= 8.5 % Assumed Average Bulk Specific Gravity = 2.55

printed 1/23/2014 10:50:27 AM



Client: AECOM
Project: Silverline
Location: Chelsea, MA Project No: GTX-301232

Boring ID: B-39 Sample Type: bag Tested By: cwd Sample ID: Bulk Test Date: 01/14/14 Checked By: jdt

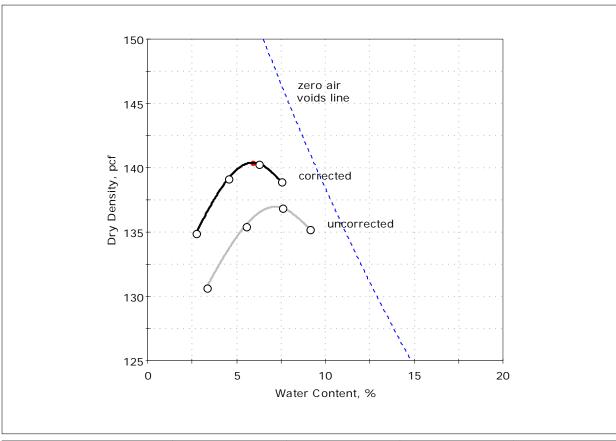
Depth: 1-5 ft Test Id: 286925

Test Comment: ---

Sample Description: Moist, very dark grayish brown gravel with silt and sand

Sample Comment: ---

Compaction Report - ASTM D1557



Data Points	Point 1	Point 2	Point 3	Point 4
Dry density, pcf	130.7	135.5	136.9	135.3
Moisture Content, %	3.3	5.5	7.6	9.1

Method : C Preparation : DRY

As received Moisture: 8 %

Rammer : Manual

Zero voids line based on assumed specific gravity of 2.85

Maximum Dry Density= 137.0 pcf Optimum Moisture= 7.0 %

Oversize Correction (17.6% > 3/4 inch Sieve)

Corrected Maximum Dry Density= 140.5 pcf Corrected Optimum Moisture= 6.0 %

Assumed Average Bulk Specific Gravity = 2.55

printed 1/23/2014 10:51:13 AM



 Client:
 AECOM

 Project:
 Silverline

 Location:
 Chelsea, MA

 Project No:
 GTX-301232

Boring ID: B-41 Sample Type: bag Tested By: cwd Sample ID: Bulk Test Date: 01/14/14 Checked By: jdt

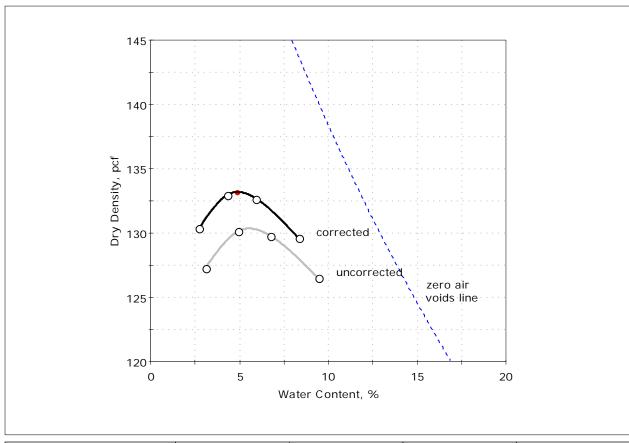
Depth: 1-5 ft Test Id: 286924

Test Comment: ---

Sample Description: Moist, very dark gray sand with silt and gravel

Sample Comment: ---

Compaction Report - ASTM D1557



Data Points	Point 1	Point 2	Point 3	Point 4
Dry density, pcf	127.3	130.1	129.8	126.5
Moisture Content, %	3.1	4.9	6.7	9.4

Method : C Preparation : DRY

As received Moisture : 6 %

Rammer : Manual

Zero voids line based on assumed specific gravity of 2.85

Maximum Dry Density= 130.5 pcf Optimum Moisture= 5.5 %

Oversize Correction (11.8% > 3/4 inch Sieve)

Corrected Maximum Dry Density= 133.0 pcf

Corrected Optimum Moisture= 5.0 % Assumed Average Bulk Specific Gravity = 2.55

printed 1/23/2014 10:52:00 AM



Client: AECOM
Project: Silverline
Location: Chelsea, MA

Boring ID: B-48 Sample Type: bag Tested By: cwd Sample ID: Bulk Test Date: 01/15/14 Checked By: jdt

GTX-301232

Project No:

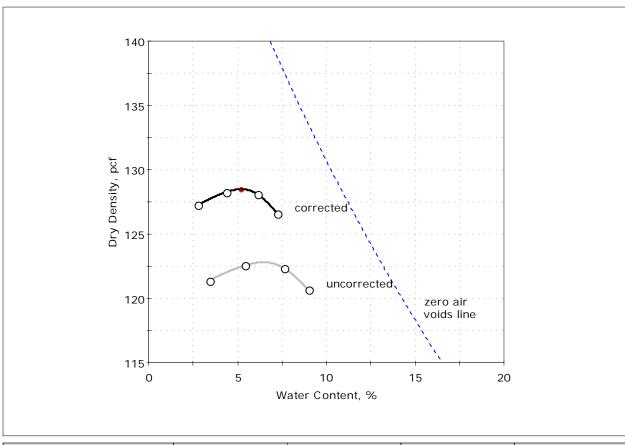
Depth: 1-5 ft Test Id: 286923

Test Comment: ---

Sample Description: Moist, very dark gray gravel with silt and sand

Sample Comment: ---

Compaction Report - ASTM D1557



Data Points	Point 1	Point 2	Point 3	Point 4
Dry density, pcf	121.4	122.6	122.3	120.7
Moisture Content, %	3.4	5.4	7.6	9.0

Method : C Preparation : DRY

As received Moisture: 10 %

Rammer : Manual

Zero voids line based on assumed specific gravity of 2.65

Maximum Dry Density= 123.0 pcf Optimum Moisture= 6.5 %

Oversize Correction (19.4% > 3/4 inch Sieve)

Corrected Maximum Dry Density= 128.5 pcf

Corrected Optimum Moisture= 5.0 % Assumed Average Bulk Specific Gravity = 2.55

printed 1/23/2014 10:52:35 AM



Client: AECOM
Project: Silverline
Location: Chelsea, MA Project No: GTX-301232

Boring ID: B-57 Sample Type: bag Tested By: cwd Sample ID: Bulk Test Date: 01/15/14 Checked By: jdt

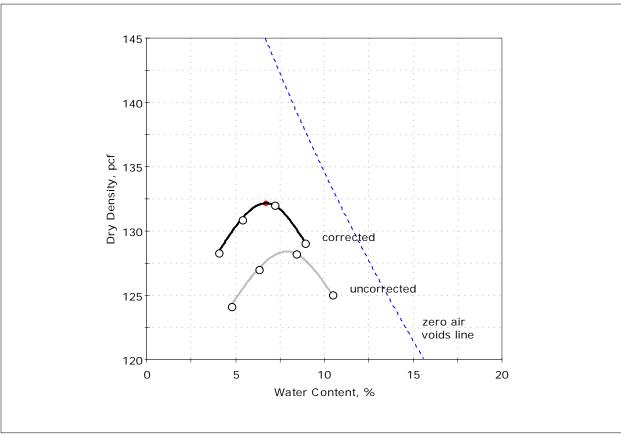
Depth: 1-5 ft Test Id: 286922

Test Comment: ---

Sample Description: Moist, very dark gray sand with silt and gravel

Sample Comment: ---

Compaction Report - ASTM D1557



Data Points	Point 1	Point 2	Point 3	Point 4
Dry density, pcf	124.2	127.0	128.2	125.0
Moisture Content, %	4.7	6.3	8.4	10.5

Method : C Preparation : DRY

As received Moisture: 12 %

Rammer : Manual

Zero voids line based on assumed specific gravity of 2.75

Maximum Dry Density= 128.5 pcf Optimum Moisture= 8.0 %

Oversize Correction (14.7% > 3/4 inch Sieve)

Corrected Maximum Dry Density= 132.0 pcf

Corrected Optimum Moisture= 6.5 %

Assumed Average Bulk Specific Gravity = 2.55

printed 1/23/2014 10:53:18 AM



Client: AECOM
Project: Silverline
Location: Chelsea, MA

Location:Chelsea, MAProject No:GTX-301232Boring ID:---Sample Type:---Tested By:jekSample ID:---Test Date:12/26/13Checked By:jdt

Depth: --- Test Id: 285460

Moisture, Ash, and Organic Matter - ASTM D2974

Boring ID	Sample ID	Depth	Description	Moisture Content,%	Ash Content,%	Organic Matter,%
B-2	SPT-5	20-22 ft	Moist, dark olive gray clayey sand	37	97.8	2.2
B-3	SPT-4	15-17 ft	Moist, dark olive gray clay	45	96.8	3.2

Notes: Moisture content determined by Method A and reported as a percentage of oven-dried mass; dried to a constant mass at temperature of 105° C

Ash content and organic matter determined by Method C; dried to constant mass at temperature 440° C



Client: AECOM
Project: Silverline

Location: Chelsea, MA Project No:

Boring ID: --- Sample Type: --- Tested By: i

Boring ID: --- Sample Type: --- Tested By: jek
Sample ID: --- Test Date: 01/27/14 Checked By: jdt

GTX-301232

Depth: --- Test Id: 287495

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-36	SPT-3	9-11 ft	Moist, very dark gray clay	20.1
B-36	SPT-5	19-21 ft	Moist, olive brown clay	24.1
B-36	SPT-7	29-31 ft	Moist, grayish brown sand with silt	21.8
B-36	SPT-9	39-41 ft	Moist, light brownish gray clay	30.6
B-50	SPT-1	9-11 ft	Wet, dark olive brown clay	108.0
B-50	SPT-4	29-31 ft	Moist, gray clay	41.1
B-50	SPT-6	39-41 ft	Moist, light brownish gray clay	39.1
B-50	SPT-9	54-56 ft	Moist, olive clay	25.9
B-50	SPT-2	14-16 ft	Moist, light brownish gray clay	33.8

Notes: Temperature of Drying: 110° Celsius



Client: AECOM
Project: Silverline
Location: Chelsea, I

Location:Chelsea, MAProject No:GTX-301232Boring ID:B-38Sample Type: jarTested By: jek

Sample ID: SPT-2 Sample Type: Jar Tested By: Jek

Depth: 10-12 ft Test Id: 286938

Test Comment: --

Sample Description: Moist, dark brown silty sand with organics

Sample Comment: ---

Moisture, Ash, and Organic Matter - ASTM D2974

Boring ID	Sample ID	Depth	Description	Moisture Content,%	Ash Content,%	Organic Matter,%
B-38	SPT-2	10-12 ft	Moist, dark brown silty sand with organics	193	67.4	32.6

Notes: Moisture content determined by Method A and reported as a percentage of oven-dried mass; dried to a constant mass at temperature of 105° C

Ash content and organic matter determined by Method C; dried to constant mass at temperature 440° C



Client: AECOM
Project: Silverline

Location: Chelsea, MA Project No:

Boring ID: --- Sample Type: --- Tested By: jek
Sample ID: --- Test Date: 12/27/13 Checked By: jdt

GTX-301232

Depth: --- Test Id: 285459

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-42	SPT-5	19-21 ft	Moist, olive gray clay	33.8
B-42	SPT-6	24-26 ft	Moist, olive gray clay	36.5
B-42	SPT-9	39-41 ft	Moist, dark olive gray clay	37.6
B-42		49-51 ft	Moist, dark olive gray clay	38.0
B-42		59-61 ft	Moist, olive gray clay	33.6

Notes: Temperature of Drying: 110° Celsius



Client: AECOM
Project: Silverline
Location: Chelsea, MA
Project No:

Boring ID: --- Sample Type: --- Tested By: jek
Sample ID: --- Test Date: 12/27/13 Checked By: jdt

GTX-301232

Depth: --- Test Id: 285625

Moisture Content of Soil and Rock - ASTM D2216

Boring ID	Sample ID	Depth	Description	Moisture Content,%
B-47	SPT-4	14-16 ft	Moist, olive clay	25.7
B-47	SPT-5	19-21 ft	Moist, olive clay	33.5

Notes: Temperature of Drying: 110° Celsius



Client: AECOM
Project: Silverline
Location: Chelsea, MA

Location:Chelsea, MAProject No:GTX-301232Boring ID:---Sample Type:---Tested By:jekSample ID:---Test Date:01/27/14Checked By:jdt

Depth: --- Test Id: 287527

Moisture, Ash, and Organic Matter - ASTM D2974

Boring ID	Sample ID	Depth	Description	Moisture Content,%	Ash Content,%	Organic Matter,%
B-44	SPT-1	6-8 ft	Moist, yellowish brown silty, clayey sand with gravel	44	95.3	4.7
B-52	SPT-1	6-8 ft	Wet, very dark brown sandy silt	65	92.2	7.8
B-59	SPT-2	10-12 ft	Moist, very dark brown sandy organic silt	167	77.1	22.9

Notes: Moisture content determined by Method A and reported as a percentage of oven-dried mass; dried to a constant mass at temperature of 105° C Ash content and organic matter determined by Method C; dried to constant mass at temperature 440° C



Client: AECOM
Project Name: Silverline
Project Location: Chelsea, MA
GTX #: 301232
Date: 12/20/13

Tested by: md
Checked by: jdt

Laboratory Vane Shear by ASTM D 4648

				Pe	eak	Resi	dual
Boring ID	Sample ID	Depth, ft	Visual Description	Vane Shear Strength, kN/m²	Vane Shear Strength, tsf	Vane Shear Strength, kN/m²	Vane Shear Strength, tsf
B-47		24-26		22.6	0.24	0.0	0.00
			Moist, greenish gray clay	23.6	0.25	0.0	0.00
				24.9	0.26	0.0	0.00
			Average	23.7	0.25	0.0	0.00

				Pe	ak	Resi	dual
Boring ID	Sample ID	Depth, ft	Visual Description	Vane Shear Strength, kN/m²	Vane Shear Strength, tsf	Vane Shear Strength, kN/m²	Vane Shear Strength, tsf
B-47	0	34-36		19.0	0.20	0.0	0.00
			Moist, greenish gray clay	16.8	0.18	0.0	0.00
				20.3	0.21	0.0	0.00
			Average	18.7	0.20	0.0	0.00

				Pe	eak	Resi	idual
Boring ID	Sample ID	Depth, ft	Visual Description	Vane Shear Strength, kN/m²	Vane Shear Strength, tsf	Vane Shear Strength, kN/m ²	Vane Shear Strength, tsf
B-47		44-46		20.4	0.21	0.0	0.00
			Moist, greenish gray clay	20.4	0.21	0.0	0.00
				13.9	0.14	0.0	0.00
			Average	18.2	0.19	0.0	0.00



Client: AECOM
Project Name: Silverline
Project Location: Chelsea, MA
GTX #: 301232
Date: 12/20/13
Tested by: md

jdt

Checked by:

Laboratory Vane Shear by ASTM D 4648

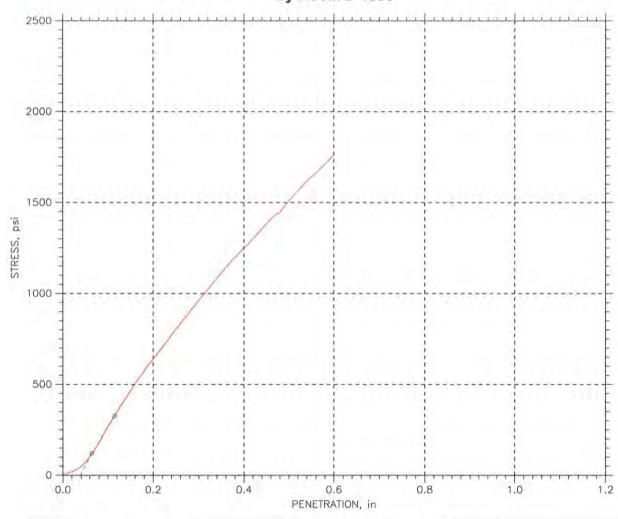
				Pe	ak	Resi	dual
Boring ID	Sample ID	Depth, ft	Visual Description	Vane Shear Strength, kN/m²	Vane Shear Strength, tsf	Vane Shear Strength, kN/m²	Vane Shear Strength, tsf
B-47		59-61		21.9	0.23	0.0	0.00
			Moist, greenish gray clay	19.0	0.20	0.0	0.00
				10.9	0.11	0.0	0.00
			Average	17.3	0.18	0.0	0.00

				Pe	ak	Resi	dual
Boring ID	Sample ID	Depth, ft	Visual Description	Vane Shear Strength, kN/m²	Vane Shear Strength, tsf	Vane Shear Strength, kN/m ²	Vane Shear Strength, tsf
B-47		79-81		19.7	0.21	0.0	0.00
			Moist, greenish gray clay with sand	21.9	0.23	0.0	0.00
				13.1	0.14	0.0	0.00
			Average	18.2	0.19	0.0	0.00

Comments:

The remolded (residual) shear strength was determined immediately after ten rapid revolutions of the vane.





Sample Height: 4,58 in	California Bearing Ratio		
Sample Area: 28.274 in^2	at 0.1 in: 42	at 0.3 in: 57	at 0.5 in: 62
Sample Volume: 0.07494 ft^3	at 0.2 in: 51	at 0.4 in: 59	
Sample Mass: 4621.2 gm			

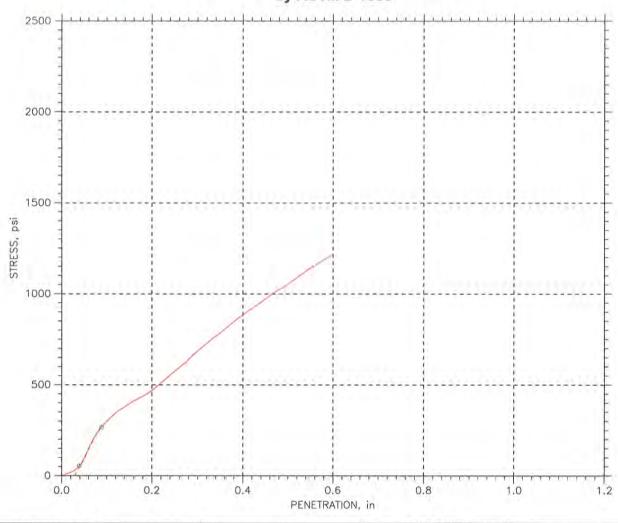
Sample Mass: 4621.2 gm				
Sample Condition: Soaked	Water Content	Before	Тор	Average
Swell: 0.02 %	Tare ID	TARE 13753	TARE12720	TARE13759
Surcharge: 4540 gm	Tare Mass, gm	8.4	8.12	8.28
Void Ratio: 0.29	Mass Tare + Wet Soil, gm	271.83	394.25	466.12
Wet Unit Weight: 135.95 pcf	Mass Tare + Dry Soil, gm	256.11	367.97	433.5
Dry Unit Weight: 127.84 pcf	Water Content, %	6.35	7.30	7.67

Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
Boring No.: B-3	Tested By: cwd	Checked By: jdt
Sample No.: Bulk	Test Date: 12/23/2013	Depth: 0-4 ft
Test No.: CBR-1	Sample Type: remolded	Elevation:

Description: Moist, very dark gray sand with silt and gravel

Remarks: Target Compaction: 95% of maximum dry density (1.35.0 pcf) at optimum moisture content (6.0%).



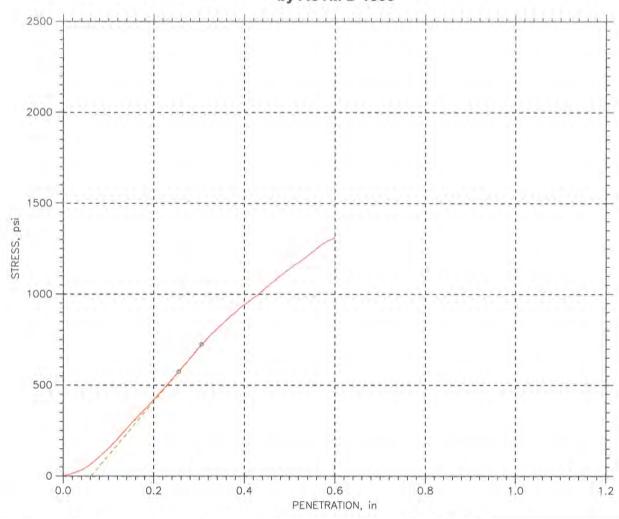


Sample Height: 4.58 in		California Bearing Ratio				
Sample Area: 28.274 in^2	at 0.1 in: 36	at 0.1 in: 36 at 0.3 in: 39		at 0.5 in: 42	12	
Sample Volume: 0.07494 ft^3	at 0.2 in: 35 at 0.4 in: 41		1			
Sample Mass: 4609.2 gm						
Sample Condition: Soaked	Water Content		Before	Тор	Average	
Swell: 0.04 %	Tare ID	Tare ID		TARE 13919	TARE 13310	
Surcharge: 4540 gm	Tare Mass, gm		8.28	8.34	8.24	
Void Ratio: 0.30	Mass Tare + Wet Soil, gm		386.88	395.65	404.04	
Wet Unit Weight: 135.6 pcf	Mass Tare + Dry Soil, gm		364.25	365.86	371.26	
Dry Unit Weight: 127.49 pcf	Water Content, %		6.36	8.33	9.03	

Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
Boring No.: B-21	Tested By: cwd	Checked By: jdt
Sample No.: Bulk	Test Date: 1/20/2014	Depth: 0-10 ft
Test No.: CBR-3	Sample Type: remolded	Elevation:

Remarks: Target Compaction: 95% of maximum dry density (134.0 pcf) at optimum moisture content (6.5%).



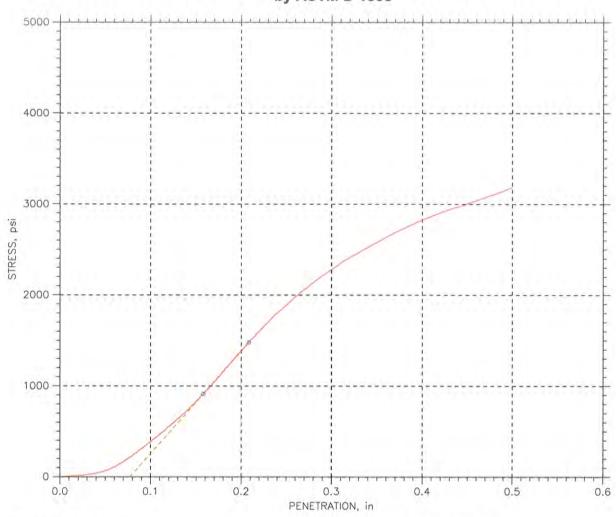


California Bearing Ratio				
at 0.1 in: 32 at 0.3 in: 45		5	at 0.5 in: 48	
at 0.2 in: 40 at 0.4 in: 46		6	17	
Water Content		Before	Тор	Average
Tare ID		TARE13663	TARE13667	TARE13669
Tare Mass, gm		8.23	8.22	8.23
Mass Tare + Wet Soil, gm		226.97	234.96	512.4
Mass Tare + Dry Soil, gm		212.77	219.36	473.61
Water Content, %		6.94	7.39	8.34
	at 0.2 in: 40 Water Content Tare ID Tare Mass, gm Mass Tare + Wet Soi Mass Tare + Dry Soi	at 0.1 in: 32 at 0.3 in: 4 at 0.2 in: 40 at 0.4 in: 4 Water Content Tare ID Tare Mass, gm Mass Tare + Wet Soil, gm Mass Tare + Dry Soil, gm	at 0.1 in: 32 at 0.3 in: 45 at 0.2 in: 40 at 0.4 in: 46 Water Content Before Tare ID TARE13663 Tare Mass, gm 8.23 Mass Tare + Wet Soil, gm 226.97 Mass Tare + Dry Soil, gm 212.77	at 0.1 in: 32 at 0.3 in: 45 at 0.5 in: 48 at 0.2 in: 40 at 0.4 in: 46 Water Content Before Top Tare ID TARE13663 TARE13667 Tare Mass, gm 8.23 8.22 Mass Tare + Wet Soil, gm 226.97 234.96 Mass Tare + Dry Soil, gm 212.77 219.36

Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
Boring No.: B-26	Tested By: cwd	Checked By: jdt	
Sample No.: Bulk(26A/26	Test Date: 2/12/2014	Depth: 1-4 ft	
Test No.: CBR-8	Sample Type: remolded	Elevation:	
Description: Moist, very dark gray	sand with silt and gravel		
Remarks: Target Compaction: 95	% of maximum dry density (134.0 pcf)	at optimum moissture cotnent (6.5%).	

Thu, 13-FEB-2014 08:54:23



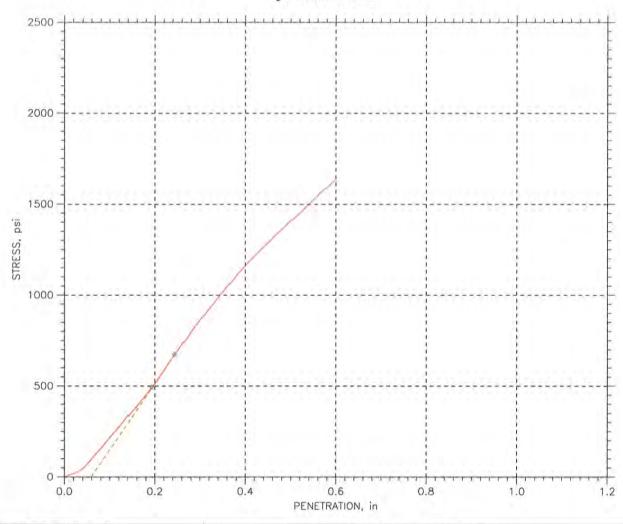


Sample Height: 4.58 in	California Bearing Ratio				
Sample Area: 28.274 in^2	at 0.1 in: 113 at 0.3 in: 143		at 0.5 in: N/A		
Sample Volume: 0.07494 ft^3	at 0.2 in: 141 at 0.4 in: 135				
Sample Mass: 4136.5 gm			V		
Sample Condition: Soaked	Water Content		Before	Тор	Average
Swell: 0.11 %	Tare ID		TARE13312	TARE13955	TARE13956
Surcharge: 4540 gm	Tare Mass, gm		8.17	8.23	8.26
Void Ratio: 0,49	Mass Tare + Wet Soil, gm		373.96	256.09	338.83
Wet Unit Weight: 121.69 pcf	Mass Tare + Dry Soil, gm		342.22	229.87	301.69
Dry Unit Weight: 111.13 pcf	Water Content, %		9.50	11,83	12.66

Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
Boring No.: B-30	Tested By: cwd	Checked By: jdt
Sample No.: Bulk(31/32)	Test Date: 2/12/2014	Depth: 1-3 ft
Test No.: CBR-9	Sample Type: remolded	Elevation:
Description: Moist, black silty grav	vel with sand	
Remarks: Target Compaction: 95	% of maximum dry density (117.0 pcf)	at optimum moissture cotnent (9.5%).

Thu, 13-FEB-2014 08:53:50

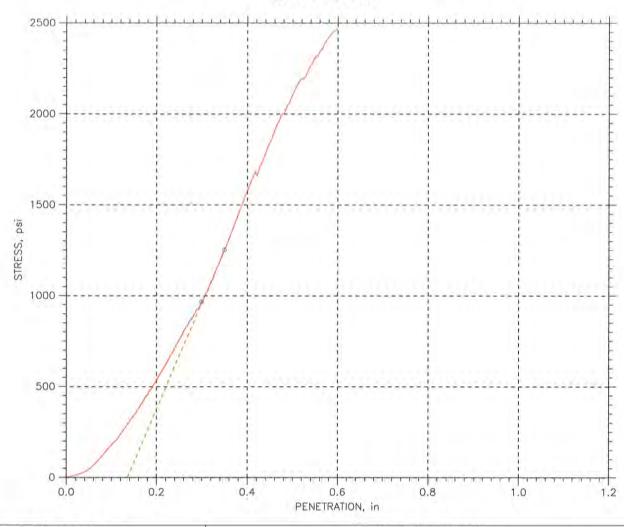




California Bearing Ratio				
at 0.1 in: 39 at 0.3 in: 55		5	at 0.5 in: 59	
at 0.2 in: 48 at 0.4 in: 57				
			15	
Water Content		Before	Тор	Average
Tore ID		TARE11569	TARE14154	TARE13735
Tare Mass, gm		7.59	8.25	8.22
Mass Tare + Wet Soil, gm		397.08	335.59	413.49
Mass Tare + Dry Soil, gm		366.18	307.62	371.89
Water Content, %		8.62	9.34	11.44
	at 0.2 in: 48 Water Content Tare ID Tare Mass, gm Mass Tare + Wet Soil Mass Tare + Dry Soil	at 0.1 in: 39 at 0.3 in: 5 at 0.2 in: 48 at 0.4 in: 5 Water Content Tare ID Tare Mass, gm Mass Tare + Wet Soil, gm Mass Tare + Dry Soil, gm	at 0.1 in: 39 at 0.3 in: 55 at 0.2 in: 48 at 0.4 in: 57 Water Content Before Tare ID TARE11569 Tare Mass, gm 7.59 Mass Tare + Wet Soil, gm 397.08 Mass Tare + Dry Soil, gm 366.18	at 0.1 in: 39 at 0.3 in: 55 at 0.5 in: 59 at 0.2 in: 48 at 0.4 in: 57 Water Content Before Top Tare ID TARE11569 TARE14154 Tare Mass, gm 7.59 8.25 Mass Tare + Wet Soil, gm 397.08 335.59 Mass Tare + Dry Soil, gm 366.18 307.62

Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
Boring No.: B-37	Tested By: cwd	Checked By; jdt	
Sample No.: Bulk	Test Date: 1/16/2014	Depth; 1-5 ft	
Test No.: CBR-2	Sample Type: remolded	Elevation:	
Description: Moist, dark grayish brow	on sand with silt and gravel		
Remarks: Target Compaction: 95%	of maximum dry density (120.5 pcf)	at optimum moisture content (8.5%).	



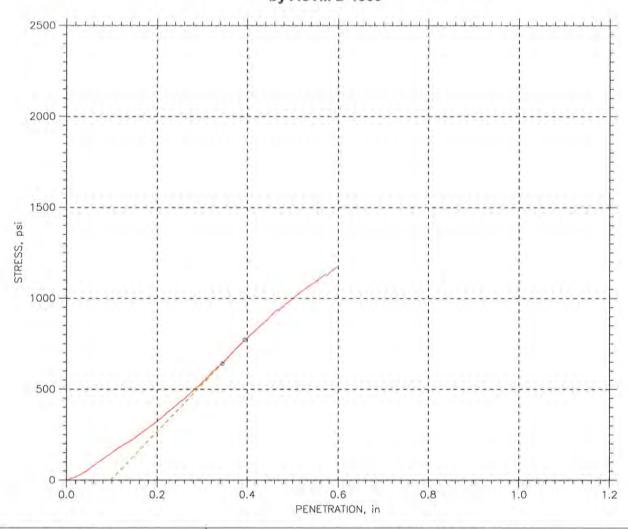


Sample Height: 4.58 in	California Bearing Ratio				
Sample Area: 28.274 in^2	at 0.1 in: 69 at 0.3 in: 93		at 0.5 in: N/A		
Sample Volume: 0.07494 ft^3	at 0.2 in: 78	0.2 in: 78 at 0.4 in: 98			
Sample Mass: 4807.2 gm					
Sample Condition: Soaked	Water Content		Before	Тор	Average
Swell: 0.00 %	Tare ID		TARE13338	TARE13525	TARE13920
Surcharge: 4540 gm	Tare Mass, gm		8.1	8.27	8.4
Void Ratio: 0.24	Mass Tare + Wet Soil, gm		499.7	517.42	485.84
Wet Unit Weight: 141.42 pcf	Mass Tare + Dry Soil, gm		471.81	484.83	452.71
Dry Unit Weight: 133.4 pcf	Water Content, %		6.01	6.84	7.46

	% of maximum dry density (140.5 pcf)	at optimum maisture content (6.0%)
Description: Moist, very dark gray	sh brown gravel with silt and sand	
Test No.: CBR-4	Sample Type: remolded	Elevation:
Sample No.: Bulk	Test Date: 1/20/2014	Depth: 1-5 ft
Boring No.: B-39	Tested By: cwd	Checked By: jdt
Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232

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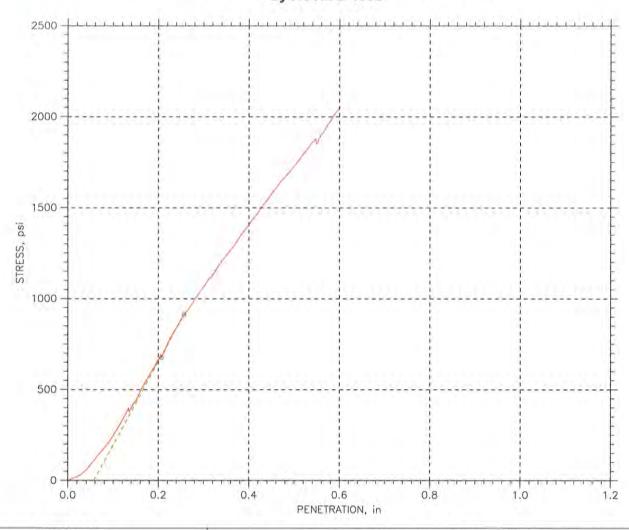
Sample Height: 4.58 in		California Bearing	Ratio
Sample Area: 28.274 in^2	at 0.1 in: 32	at 0.3 in: 41	at 0.5 in: 45
Sample Volume: 0.07494 ft^3	at 0.2 in: 35	at 0.4 in; 43	
Sample Mass: 4511.5 gm			

Sample Mass: 4511.5 gm				
Sample Condition: Soaked	Water Content	Before	Тор	Average
Swell: 0,00 %	Tare ID	TARE 1 1882	TARE12276	TARE 13898
Surcharge: 4540 gm	Tare Mass, gm	7.61	8.17	8.28
Void Ratio: 0.31	Mass Tare + Wet Soil, gm	465.07	414.93	467.82
Wet Unit Weight: 132.72 pcf	Mass Tare + Dry Soil, gm	443.22	385.03	432.26
Dry Unit Weight: 126.38 pcf	Water Content, %	5.02	7.93	8.39
Dry Unit Weight: 126.38 pcf	Water Content, %	5.02	7.93	

Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
Boring No.: B-41	Tested By: cwd	Checked By: jdt
Sample No.: Bulk	Test Date: 1/20/2014	Depth: 1-5 ft
Test No.: CBR-5	Sample Type: remolded	Elevation:

Remarks: Target Compaction: 95% of maximum dry density (133.0 pcf) at optimum moisture content (5.0%).

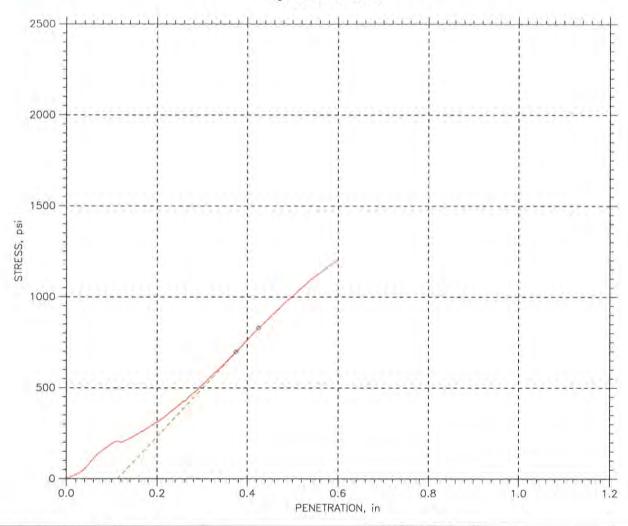




Sample Height: 4.58 in	California Bearing Ratio				
Sample Area: 28.274 in^2	at 0.1 in: 48 at 0.3 in: 66		at 0.5 in: 73		
Sample Volume: 0.07494 ft^3	at 0.2 in: 61 at 0.4 in: 70				
Sample Mass: 4356.2 gm		1			
Sample Condition: Soaked	Water Content		Before	Тор	Average
Swell: 0.04 %	Tare ID		TARE13240	TARE12287	TARE12969
Surcharge: 4540 gm	Tare Mass, gm		8.35	8.11	8.18
Void Ratio: 0.35	Mass Tare + Wet Soil, gm		412.04	339.62	471.81
Wet Unit Weight: 128.15 pcf	Mass Tare + Dry Soil, gm		393.21	314.06	433.78
Dry Unit Weight: 122.18 pcf	Water Content, %		4.89	8.35	8.94

Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232	
Boring No.: B-48	Tested By: cwd	Checked By: jdt	
Sample No.: Bulk	Test Date: 1/20/2014	Depth: 1-5 ft	
Test No.: CBR-6	Sample Type: remolded	Elevation:	
Description: Moist, very dark gray g	ravel with silt and sand		
Remarks: Target Compaction: 95%	of maximum dry density (128.5 pcf)	at optimum moisture content (5.0%).	





Sample Height: 4.58 in	California Bearing Ratio				
Sample Area: 28.274 in^2	at 0.1 in: 33 at 0.3 in: 42		2	at 0.5 in: N/A	
Sample Volume: 0.07494 ft^3	at 0.2 in: 36 at 0.4 in: 45				
Sample Mass: 4544.3 gm					
Sample Condition: Soaked	Water Content		Before	Тор	Average
Swell; 0.02 %	Tare ID		TARE 13270	TARE13543	TARE 13544
Surcharge: 4540 gm	Tare Mass, gm		16.48	8.15	8.19
Void Ratio: 0.32	Mass Tare + Wet Soil, gm		906.48	372.77	461.34
Wet Unit Weight: 133.69 pcf	Mass Tare + Dry Soil, gm		852.13	346.86	425.26
Dry Unit Weight: 125.52 pcf	Water Content, %		6.50	7.65	8.65

Project: Silverline	Location: Chelsea, MA	Project No.: GTX-301232
Boring No.: B-57	Tested By: cwd	Checked By: jdt
Sample No.: Bulk	Test Date: 1/20/2014	Depth: 1-5 ft
Test No.: CBR-7	Sample Type: remolded	Elevation:
Description: Moist, very dark gra	y sand with silt and gravel	
Remarks: Target Compaction: 9	95% of maximum dry density (132.0 pcf)	at optimum moisture content (6.5%).

Serial_No:12101313:00



ANALYTICAL REPORT

Lab Number: L1324835

Client: Geo Testing Express

125 Nagog Park Acton, MA 01720

ATTN: Joe Tomei

Phone: (978) 893-1241

Project Name: SILVERLINE

Project Number: GTX :301232

Report Date: 12/10/13

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Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), USDA (Permit #P-330-11-00240), NC (666), TX (T104704476), DOD (L2217), US Army Corps of Engineers.

Eight Walkup Drive, Westborough, MA 01581-1019 508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com



Serial_No:12101313:00

Project Name:SILVERLINELab Number:L1324835Project Number:GTX :301232Report Date:12/10/13

Alpha Sample ID	Client ID	Sample Location	Collection Date/Time
L1324835-01	SPT-3, B-5, 4-6 FT	Not Specified	12/06/13 00:00
L1324835-02	SPT-3, B-1, 4-6 FT	Not Specified	12/06/13 00:00
L1324835-03	SPT-3, B-15, 4-6 FT	Not Specified	12/06/13 00:00



Serial_No:12101313:00

Project Name:SILVERLINELab Number:L1324835Project Number:GTX :301232Report Date:12/10/13

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. Performance criteria for CAM and RCP methods allow for some LCS compound failures to occur and still be within method compliance. In these instances, the specific failures are not narrated but are noted in the associated QC table. This information is also incorporated in the Data Usability format for our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Cypellia for Chen Cynthia McQueen

Authorized Signature:

Title: Technical Director/Representative

ΔLPHA

Date: 12/10/13

INORGANICS & MISCELLANEOUS



Serial_No:12101313:00

Not Specified

Project Name: Lab Number: SILVERLINE L1324835 Project Number: GTX:301232

Report Date: 12/10/13

SAMPLE RESULTS

Lab ID: L1324835-01 Date Collected: 12/06/13 00:00 SPT-3, B-5, 4-6 FT Date Received: Client ID: 12/06/13

Not Specified Sample Location: Field Prep:

Matrix: Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - \	Westborough Lab									
Solids, Total	75.3		%	0.100	NA	1	-	12/06/13 22:42	30,2540G	RT
Chloride	93		mg/kg	13		1	-	12/09/13 11:25	1,9251	LA
Sulfate	ND		mg/kg	130		1	-	12/09/13 15:45	1,9038	MP



Serial_No:12101313:00

Project Name: Lab Number: SILVERLINE Project Number: GTX:301232

L1324835

Report Date: 12/10/13

SAMPLE RESULTS

Lab ID: L1324835-02 SPT-3, B-1, 4-6 FT Client ID:

Date Received:

12/06/13 00:00

Not Specified Sample Location:

Date Collected:

12/06/13

Matrix: Soil

Not Specified Field Prep:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Wes	tborough La	b								
Solids, Total	77.0		%	0.100	NA	1	-	12/06/13 22:42	30,2540G	RT
Chloride	24		mg/kg	12		1	-	12/09/13 11:25	1,9251	LA
Sulfate	160		mg/kg	130		1	-	12/09/13 15:45	1,9038	MP



Serial_No:12101313:00

Project Name: SILVERLINE

Lab Number:

L1324835

Project Number: GTX:301232

Report Date:

12/10/13

SAMPLE RESULTS

Lab ID:

L1324835-03

Client ID:

SPT-3, B-15, 4-6 FT

Sample Location:

Not Specified

Matrix:

Soil

Date Collected:

12/06/13 00:00

Date Received:

12/06/13

Field Prep:

Not Specified

·

Parameter	Result (Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - \	Westborough Lab									
Solids, Total	76.2		%	0.100	NA	1	-	12/06/13 22:42	30,2540G	RT
Chloride	ND		mg/kg	12		1	-	12/09/13 11:26	1,9251	LA
Sulfate	ND		mg/kg	130		1	-	12/09/13 15:45	1,9038	MP



Serial_No:12101313:00

Project Name: Lab Number: SILVERLINE L1324835 Project Number: GTX:301232

Report Date: 12/10/13

Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst			
General Chemistry - Westborough Lab for sample(s): 01-03 Batch: WG657266-1												
Chloride	ND	mg/kg	10		1	-	12/09/13 10:53	1,9251	LA			
General Chemistry - V	Vestborough Lab for sam	nple(s): 01-	-03 Ba	atch: Wo	G657276-1							
Sulfate	ND	mg/kg	100		1	-	12/09/13 15:45	1,9038	MP			



Lab Control Sample Analysis Batch Quality Control

Lab Number:

GTX:301232 SILVERLINE

Project Number: Project Name:

L1324835 12/10/13 Report Date:

	rcs		CSD		%Recovery				
ameter	%Recovery	Qual	%Recovery	Qual	Limits	RPD	Qual	RPD Limits	

General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG657266-2 66 Chloride

89-109

35

General Chemistry - Westborough Lab Associated sample(s): 01-03 Batch: WG657276-2

86

Sulfate

12

80-121

Page 9 of 20

Matrix Spike Analysis Batch Quality Control

L1324835 Lab Number:

Report Date:

12/10/13

GTX:301232 SILVERLINE

Project Number: Project Name:

	Native	MS	MS	MS	MSD		Reco	Recovery		RPD	
Parameter	Sample	Added	Found	Found "Recovery Qual Found	Qual Four		"Recovery Qual Limits RPD Qual Limits	nits F	RPD Q	ual Limits	
General Chemistry - \	Seneral Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG657266-4 QC Sample: L1324419-02 Client ID: MS Sample	ociated samp	le(s): 01-03	QC Batch ID): WG657266	4 QC Sample:	L1324419-02	Client	ID: MS	Sample	
Chloride	230	497	1000	105	·		62-129	129		35	
General Chemistry - \	General Chemistry - Westborough Lab Associated sample(s): 01-03 QC Batch ID: WG657276-4 QC Sample: L1324664-03 Client ID: MS Sample	ociated samp	le(s): 01-03	QC Batch ID): WG657276	4 QC Sample:	L1324664-03	Client	ID: MS	Sample	
Sulfate	Q	220	260	120	•		-55-	22-183		12	

Lab Duplicate Analysis Batch Quality Control

GTX:301232 SILVERLINE

Project Number: Project Name:

L1324835 12/10/13 Lab Number: Report Date:

Parameter	Native Sample	ole Duplicate Sample Units	le Units	RPD	Qual	RPD Qual RPD Limits
General Chemistry - Westborough Lab Associated sample(s):		01-03 QC Batch ID: WG656950-1 QC Sample: L1324772-01 Client ID: DUP Sample	QC Sample: L	1324772-01	Client ID: I	OUP Sample
Solids, Total	88.2	91.2	%	ო		20
General Chemistry - Westborough Lab Associated sample(s):		01-03 QC Batch ID: WG657266-3 QC Sample: L1324419-02 Client ID: DUP Sample	QC Sample: L	1324419-02	Client ID: I	OUP Sample
Chloride	530	520	mg/kg	0		35
General Chemistry - Westborough Lab Associated sample(s): FT		01-03 QC Batch ID: WG657276-3 QC Sample: L1324835-01 Client ID: SPT-3, B-5, 4-6	QC Sample: L	1324835-01	Client ID: 8	SPT-3, B-5, 4-6
Sulfate	N	QN	mg/kg	N		72



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Sample Receipt and Container Information

Were project specific reporting limits specified?

Reagent H2O Preserved Vials Frozen on: NA

Cooler Information Custody Seal

Cooler

A Absent

Container Info	rmation			Temp			
Container ID	Container Type	Cooler	рН	deg C	Pres	Seal	Analysis(*)
L1324835-01A	Glass 250ml unpreserved	Α	N/A	5.1	Υ	Absent	CL-9251(28),SO4- 9038(28),TS(7)
L1324835-02A	Glass 250ml unpreserved	Α	N/A	5.1	Υ	Absent	CL-9251(28),SO4- 9038(28),TS(7)
L1324835-03A	Glass 250ml unpreserved	Α	N/A	5.1	Υ	Absent	CL-9251(28),SO4- 9038(28),TS(7)



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GLOSSARY

Acronyms

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

 Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NI - Not Ignitable.

RED Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

Footnotes

 The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

SRM

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Data Qualifiers

- A Spectra identified as "Aldol Condensation Product".
- -The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit.
- Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations
 of the analyte.
- E Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.
- H The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I The lower value for the two columns has been reported due to obvious interference.

Report Format: Data Usability Report



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Data Qualifiers

- M Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- NJ Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P The RPD between the results for the two columns exceeds the method-specified criteria.
- Q -The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- **R** Analytical results are from sample re-analysis.
- **RE** Analytical results are from sample re-extraction.
- S Analytical results are from modified screening analysis.

Report Format: Data Usability Report



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REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

30 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



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Certificate/Approval Program Summary

Last revised November 12, 2013 - Westboro Facility

The following list includes only those analytes/methods for which certification/approval is currently held. For a complete listing of analytes for the referenced methods, please contact your Alpha Customer Service Representative.

Connecticut Department of Public Health Certificate/Lab ID: PH-0574. NELAP Accredited Solid Waste/Soil.

Drinking Water (Inorganic Parameters: Color, pH, Turbidity, Conductivity, Alkalinity, Chloride, Free Residual Chlorine, Fluoride, Calcium Hardness, Sulfate, Nitrate, Nitrite, Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Selenium, Silver, Sodium, Thallium, Zinc, Total Dissolved Solids, Total Organic Carbon, Total Cyanide, Perchlorate. Organic Parameters: Volatile Organics 524.2, Total Trihalomethanes 524.2, 1,2-Dibromo-3-chloropropane (DBCP) 504.1, Ethylene Dibromide (EDB) 504.1, 1,4-Dioxane (Mod 8270). Microbiology Parameters: Total Coliform-MF mEndo (SM9222B), Total Coliform – Colilert (SM9223, Enumeration and P/A), E. Coli. – Colilert (SM9223, Enumeration and P/A), HPC – Pour Plate (SM9215B), Fecal Coliform – MF m-FC (SM9222D), Fecal Coliform-EC Medium (SM 9221E).

Wastewater/Non-Potable Water (Inorganic Parameters: Color, pH, Conductivity, Acidity, Alkalinity, Chloride, Total Residual Chlorine, Fluoride, Total Hardness, Silica, Sulfate, Sulfide, Ammonia, Kjeldahl Nitrogen, Nitrate, Nitrite, O-Phosphate, Total Phosphorus, Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Hexavalent Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Strontium, Thallium, Tin, Titanium, Vanadium, Zinc, Total Residue (Solids), Total Dissolved Solids, Total Suspended Solids (non-filterable), BOD, CBOD, COD, TOC, Total Cyanide, Phenolics, Foaming Agents (MBAS), Bromide, Oil and Grease. Organic Parameters: PCBs, Organochlorine Pesticides, Technical Chlordane, Toxaphene, Acid Extractables (Phenols), Benzidines, Phthalate Esters, Nitrosamines, Nitroaromatics & Isophorone, Polynuclear Aromatic Hydrocarbons, Haloethers, Chlorinated Hydrocarbons, Volatile Organics, TPH (HEM/SGT), CT-Extractable Petroleum Hydrocarbons (ETPH), MA-EPH, MA-VPH. Microbiology Parameters: Total Coliform – MF mEndo (SM9222B), Total Coliform – MTF (SM9221B), E. Coli – Colilert (SM9223 Enumeration), HPC – Pour Plate (SM9215B), Fecal Coliform – MF m-FC (SM9222D), Fecal Coliform – A-1 Broth (SM9221E), Enterococcus - Enterolert.

Solid Waste/Soil (Inorganic Parameters: pH, Sulfide, Aluminum, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Calcium, Chromium, Hexavalent Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Molybdenum, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Tin, Vanadium, Zinc, Total Cyanide, Ignitability, Phenolics, Corrosivity, TCLP Leach (1311), SPLP Leach (1312 metals only), Reactivity. Organic Parameters: PCBs, PCBs in Oil, Organochlorine Pesticides, Technical Chlordane, Toxaphene, CT-Extractable Petroleum Hydrocarbons (ETPH), MA-EPH, MA-VPH, Dicamba, 2,4-D, 2,4,5-T, 2,4,5-TP(Silvex), Dalapon, Volatile Organics (SW 8260), Acid Extractables (Phenols) (SW 8270), Benzidines (SW 8270), Phthalates (SW 8270), Nitrosamines (SW 8270), Nitroaromatics & Cyclic Ketones (SW 8270), PAHs (SW 8270), Haloethers (SW 8270), Chlorinated Hydrocarbons (SW 8270).)

State of Illinois Certificate/Lab ID: 003155. NELAP Accredited.

Drinking Water (Inorganic Parameters: SM2120B, 2320B, 2510B, 2540C, SM4500CN-CE, 4500F-C, 4500H-B, 4500NO3-F, 5310C, EPA 200.7, 200.8, 245.1, 300.0. Organic Parameters: EPA 504.1, 524.2.)

Wastewater/Non-Potable Water (Inorganic Parameters: SM2120B, 2310B, 2320B, 2340B, 2510B, 2540B, 2540C, 2540D, SM4500CL-E, 4500CN-E, 4500F-C, 4500H-B, 4500NH3-H, 4500NO2-B, 4500NO3-F, 4500P-E, 4500S-D, 4500SO3-B, 5210B, 5220D, 5310C, 5540C, EPA 120.1, 1664A, 200.7, 200.8, 245.1, 300.0, 350.1, 351.1, 353.2, 410.4, 420.1. Organic Parameters: EPA 608, 624, 625.)

Hazardous and Solid Waste (Inorganic Parameters: EPA 1010A, 1030, 1311, 1312, 6010C, 6020A, 7196A, 7470A, 7471B, 9012B, 9014, 9038, 9040C, 9045D, 9050A, 9065, 9251. Organic Parameters: 8011 (NPW only), 8015C, 8081B, 8082A, 8151A, 8260C, 8270D, 8315A, 8330.)

Maine Department of Human Services Certificate/Lab ID: 2009024.

Drinking Water (Inorganic Parameters: SM9215B, 9222D, 9223B, EPA 180.1, 353.2, SM2120B, 2130B, 2320B, 2510C, 2540C, 4500Cl-D, 4500CN-C, 4500CN-E, 4500F-C, 4500H+B, 4500NO3-F, 5310C, EPA 200.7, EPA 200.8, 245.1, EPA 300.0. <u>Organic Parameters</u>: 504.1, 524.2.)

Wastewater/Non-Potable Water (Inorganic Parameters: EPA 120.1, 1664A, 300.0, 350.1, 351.1, 353.2, 410.4, 420.1, 8315A, 9010C, SM2120B, 2310B, 2320B, 2510B, 2540B, 2540C, 2540D, 426C, 4500Cl-E, 4500CN-C, 4500CN-E, 4500F-B, 4500F-C, 4500H+B, 4500Norg-C, 4500NH3-B, 4500NH3-H, 4500NO2-B, 4500NO3-F, 4500P-B, 4500P-E, 4500S2-D, 4500SO3-B, 5540C, 5210B, 5220D, 5310C, 9010B, 9030B, 9040C, 7470A, 7196A, 2340B, EPA 200.7, 6010C, 200.8, 6020A, 245.1, 1311, 1312, 3005A, Enterolert, 9223B, 9222D. Organic Parameters: 608, 624, 625, 8011, 8081B, 8082A, 8330, 8151A, 8260C, 8270D, 3510C, 3630C, 5030B, ME-DRO, ME-GRO, MA-EPH, MA-VPH.)

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Solid Waste/Soil (Inorganic Parameters: 9010B, 9012A, 9014, 9040B, 9045C, 6010C, 6020A, 7471B, 7196A, 9050A, 1010, 1030, 9065, 1311, 1312, 3005A, 3050B, 9038, 9251. Organic Parameters: ME-DRO, ME-GRO, MA-EPH, MA-VPH, 8260C, 8270D, 8330, 8151A, 8081B, 8082A, 3540C, 3546, 3580A, 3620C, 3630C, 5030B, 5035.)

Massachusetts Department of Environmental Protection Certificate/Lab ID: M-MA086.

Drinking Water (Inorganic Parameters: (EPA 200.8 for: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl) (EPA 200.7 for: Ba,Be,Ca,Cd,Cr,Cu,Na,Ni) 245.1, (300.0 for: Nitrate-N, Fluoride, Sulfate); (EPA 353.2 for: Nitrate-N, Nitrite-N); (SM4500NO3-F for: Nitrate-N and Nitrite-N); 4500F-C, 4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, 2320B, SM2540C, SM4500H-B. Organic Parameters: (EPA 524.2 for: Trihalomethanes, Volatile Organics); (504.1 for: 1,2-Dibromoethane, 1,2-Dibromo-3-Chloropropane), EPA 332. Microbiology Parameters: SM9215B; ENZ. SUB. SM9223; ColilertQT SM9223B; MF-SM9222D.)

Non-Potable Water (Inorganic Parameters:, (EPA 200.8 for: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn); (EPA 200.7 for: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn); 245.1, SM4500H,B, EPA 120.1, SM2510B, 2540C, 2340B, 2320B, 4500CL-E, 4500F-BC, 426C, SM4500NH3-BH, (EPA 350.1 for: Ammonia-N), LACHAT 10-107-06-1-B for Ammonia-N, SM4500NO3-F, 353.2 for Nitrate-N, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, 4500P-B,E, 5220D, EPA 410.4, SM 5210B, 5310C, 4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.

Organic Parameters: (EPA 624 for Volatile Halocarbons, Volatile Aromatics),(608 for: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan II, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs-Water), (EPA 625 for SVOC Acid Extractables and SVOC Base/Neutral Extractables), 600/4-81-045-PCB-Oil. Microbiology Parameters: (ColilertQT SM9223B; Enterolert-QT: SM9222D-MF.)

New Hampshire Department of Environmental Services <u>Certificate/Lab ID</u>: 200307. *NELAP Accredited. Drinking Water* (<u>Inorganic Parameters</u>: SM 9222B, 9223B, 9215B, EPA 200.7, 200.8, 300.0, SM4500CN-E, 4500H+B, 4500NO3-F, 2320B, 2510B, 2540C, 4500F-C, 5310C, 2120B, EPA 332.0. Organic Parameters: 504.1, 524.2.)

Non-Potable Water (Inorganic Parameters: SM9222D, 9221B, 9222B, 9221E-EC, EPA 3005A, 200.7, 200.8, 245.1, SW-846 6010C, 6020A, 7196A, 7470A, SM3500-CR-D, EPA 120.1, 300.0, 350.1, 350.2, 351.1, 353.2, 410.4, 420.1, 426C, 1664A, SW-846 9010B, 9010C, 9030, 9040B, 9040C, SM2120B, 2310B, 2320B, 2340B, 2540B, 2540D, 4500H+B, 4500CL-E, 4500CN-E, 4500NH3-H, 4500NO3-F, 4500NO2-B, 4500P-E, 4500-S2-D, 4500SO3-B, 5210B, 5220D, 2510B, 2540C, 4500F-C, 5310C, 5540C, LACHAT 10-204-00-1-A, LACHAT 10-107-06-2-D, 3060A. Organic Parameters: SW-846 3510C, 3630C, 5030B, 8260C, 8270D, 8330, EPA 624, 625, 608, SW-846 8082A, 8081B, 8015C, 8151A, 8330, 8270D-SIM.)

Solid & Chemical Materials (Inorganic Parameters: SW-846 6010C, 6020A, 7196A, 7471B, 1010, 1010A, 1030, 9010C, 9012B, 9014, 9030B, 9040C, 9045C, 9045D, 9050, 9065, 9251, 1311, 1312, 3005A, 3050B, 3060A. Organic Parameters: SW-846 3540C, 3546, 3050B, 3580A, 3620D, 3630C, 5030B, 5035, 8260C, 8270D, 8270D-SIM, 8330, 8151A, 8015B, 8015C, 8082A, 8081B.)

New Hampshire Department of Environmental Services <u>Certificate/Lab ID</u>: 2064. *NELAP Accredited. Drinking Water* (<u>Organic Parameters</u>: **EPA 524.2**: Di-isopropyl ether (DIPE), Ethyl-t-butyl ether (ETBE), Tert-amyl methyl ether (TAME)).

Non-Potable Water (Organic Parameters: EPA 8260C: 1,3,5-Trichlorobenzene. EPA 8015C(M): TPH.)

Solid & Chemical Materials (Organic Parameters: EPA 8260C: 1,3,5-Trichlorobenzene.)

New Jersey Department of Environmental Protection Certificate/Lab ID: MA935. NELAP Accredited.

Drinking Water (Inorganic Parameters: SM9222B, 9221E, 9223B, 9215B, 4500CN-CE, 4500NO3-F, 4500F-C, EPA 300.0, 200.7, 200.8, 245.1, 2540C, SM2120B, 2320B, 2510B, 5310C, SM4500H-B. Organic Parameters: EPA 332, 504.1, 524.2.)

Non-Potable Water (Inorganic Parameters: SM5210B, EPA 410.4, SM5220D, 4500Cl-E, EPA 300.0, SM2120B, 2340B, SM4500F-BC, EPA 200.7, 200.8, 351.1, LACHAT 10-107-06-2-D, EPA 353.2, SM4500NO3-F, 4500NO2-B, EPA 1664A, SM5310C, 4500-PE, EPA 420.1, SM4500P-B5+E, 2540B, 2540C, 2540D, EPA 120.1, SM2510B, 9222D, 9221B, 9221C, 9221E, 9222B, 9215B, 2310B, 2320B, 4500NH3-H, 4500-S D, 4500SO4-E, EPA 350.1, 350.2, SW-846 1312, 7470A, 5540C, SM4500H-B, 4500SO3-B, SM3500Cr-D, 4500CN-CE, EPA 245.1, SW-846 9040B, 9040C, 3005A, 3015, EPA 6010B, 6010C, 6020, 6020A, 7196A, 3060A, SW-846 9010C, 9030B. Organic Parameters: SW-846 8260B, 8260C, 8270C, 8270D, 8270C-SIM, 8270D-SIM, 3510C, EPA 608, 624, 625, SW-846 3630C, 5030B, 5030C, 8011, 8015C, 8081A, 8081B, 8082, 8082A, 8151A, 8330, 1,4-Dioxane by NJ Modified 8270, 8015B, NJ EPH.)

Page 50/id & Chemical Materials (Inorganic Parameters: SW-846, 6010B, 6010C, 6020, 6020A, 7196A, 3060A, 9030B, 1010, 1010A, 1030, 1311, 1312, 3005A, 3050B, 7471A, 7471B, 9010C, 9012B, 9014, 9038, 9040B, 9040C, 9045C, 9045D,

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9050A, 9065, 9251. Organic Parameters: SW-846 8015B, 8015C, 8081A, 8081B, 8082, 8082A, 8151A, 8330, 8260B, 8260C, 8270C, 8270D, 8270C-SIM, 8270D-SIM, 3540C, 3546, 3580A, 3620C, 3630C, 5030B, 5030C, 5035L, 5035H, NJ EPH.)

New York Department of Health Certificate/Lab ID: 11148. NELAP Accredited.

Drinking Water (Inorganic Parameters: SM9223B, 9222B, 9215B, EPA 200.8, 200.7, 245.1, SM5310C, EPA 332.0, SM2320B, EPA 300.0, SM2120B, 4500CN-E, 4500F-C, 4500NO3-F, 2540C, SM 2510B. Organic Parameters: EPA 524.2, 504.1.)

Non-Potable Water (Inorganic Parameters: SM9221E, 9222D, 9221B, 9222B, 9215B, 5210B, 5310C, EPA 410.4, SM5220D, 2310B, 2320B, EPA 200.7, 300.0, SM4500CL-E, 4500F-C, SM15 426C, EPA 350.1, SM4500NH3-BH, EPA 351.1, LACHAT 10-107-06-2, EPA 353.2, SM4500-NO3-F, 4500-NO2-B, 4500P-E, 2340B, 2540C, 2540B, 2540D, EPA 200.8, EPA 6010C, 6020A, EPA 7196A, SM3500Cr-D, EPA 245.1, 7470A, SM2120B, 4500CN-CE, EPA 1664A, EPA 420.1, SM14 510C, EPA 120.1, SM2510B, SM4500S-D, SM5540C, EPA 8315A, 3005A, 9010C, 9030B. Organic Parameters: EPA 624, 8260C, 8270D, 8270D-SIM, 625, 608, 8081B, 8151A, 8330A, 8082A, EPA 3510C, 5030B, 5030C, 8015C, 8011.)

Solid & Hazardous Waste (Inorganic Parameters: EPA 1010A, 1030, EPA 6010C, 6020A, 7196A, 7471B, 8315A, 9012B, 9014, 9065, 9050A, 9038, 9251, EPA 1311, 1312, 3005A, 3050B, 9010C, 9030B, 9040C, 9045D. Organic Parameters: EPA 8260C, 8270D, 8270D-SIM, 8015C, 8081B, 8151A, 8330A, 8082A, 3540C, 3546, 3580A, 5035A-H, 5035A-L.)

North Carolina Department of the Environment and Natural Resources Certificate/Lab ID: 666. (Inorganic Parameters: SM2310B, 2320B, 4500Cl-E, 4500Cn-E, 9012B, 9014, Lachat 10-204-00-1-X, 1010A, 1030, 4500NO3-F, 353.2, 4500P-E, 4500SO4-E, 300.0, 4500S-D, 5310B, 5310C, 6010C, 6020A, 200.7, 200.8, 3500Cr-B, 7196A, 245.1, 7470A, 7471B, 1311,1312. Organic Parameters: 608, 8081B, 8082A, 624, 8260B, 625, 8270D, 8151A, 8015C, 504.1, MA-EPH, MA-VPH.)

Drinking Water Program Certificate/Lab ID: 25700. (Inorganic Parameters: Chloride EPA 300.0. Organic Parameters: 524.2)

Pennsylvania Department of Environmental Protection Certificate/Lab ID: 68-03671. *NELAP Accredited.*Drinking Water (Inorganic Parameters: 200.7, 200.8, 300.0, 332.0, 2120B, 2320B, 2510B, 2540C, 4500-CN-CE, 4500F-C, 4500H+-B, 4500NO3-F, 5310C. Organic Parameters: EPA 524.2, 504.1)

Non-Potable Water (Inorganic Parameters: EPA 120.1, 1312, 3005A,3015, 3060A, 200.7, 200.8, 410.4, 1664A, SM2540D, 5210B, 5220D, 4500-P,BE, 245.1, 300.0, 350.1, 350.2, 351.1, 353.2, 420.1, 6010C, 6020A, 7196A, 7470A, 9030B, 2120B, 2310B, 2320B, 2510B, 2540B, 2540C, 3500Cr-D, 426C, 4500CN-CE, 4500Cl-E, 4500F-B, 4500F-C, 4500H+-B, 4500NH3-H, 4500NO2-B, 4500NO3-F, 4500S-D, 4500SO3-B, 5310BCD, 5540C, 9010C, 9040C. Organic Parameters: EPA 3510C, 3630C, 5030B, 625, 624, 608, 8081B, 8082A, 8151A, 8260C, 8270D, 8270D-SIM, 8330, 8015C, NJ-EPH.)

Solid & Hazardous Waste (Inorganic Parameters: EPA 350.1, 1010, 1030, 1311, 1312, 3005A, 3050B, 3060A, 6010C, 6020A, 7196A, 7471B, 9010C, 9012B, 9014, 9040B, 9045D, 9050A, 9065, SM 4500NH3-BH, 9030B, 9038, 9251. Organic Parameters: 3540C, 3546, 3580A, 3620C, 3630C, 5035, 8015C, 8081B, 8082A, 8151A, 8260C, 8270D, 8270D-SIM, 8330, NJ-EPH.)

Rhode Island Department of Health Certificate/Lab ID: LAO00065. *NELAP Accredited via NJ-DEP*. Refer to MA-DEP Certificate for Potable and Non-Potable Water. Refer to NJ-DEP Certificate for Potable and Non-Potable Water.

Texas Commisson on Environmental Quality <u>Certificate/Lab ID</u>: T104704476. *NELAP Accredited. Non-Potable Water* (<u>Inorganic Parameters</u>: EPA 120.1, 1664, 200.7, 200.8, 245.1, 245.2, 300.0, 350.1, 351.1, 353.2, 410.4, 420.1, 6010, 6020, 7196, 7470, 9040, SM 2120B, 2310B, 2320B, 2510B, 2540B, 2540C, 2540D, 426C, 4500CL-E, 4500CN-E, 4500F-C, 4500H+B, 4500NH3-H, 4500NO2B, 4500P-E, 4500 S2⁻ D, 510C, 5210B, 5220D, 5310C, 5540C. <u>Organic Parameters</u>: EPA 608, 624, 625, 8081, 8082, 8151, 8260, 8270, 8330.)

Solid & Hazardous Waste (Inorganic Parameters: EPA 1311, 1312, 9012, 9014, 9040, 9045, 9050, 9065.)

Virginia Division of Consolidated Laboratory Services Certificate/Lab ID: 460195. NELAP Accredited.

Drinking Water (Inorganic Parameters: EPA 200.7, 200.8, 300.0, 2510B, 2120B, 2540C, 4500CN-CE, 245.1, 2320B, 4500F-C, 4500NO3-F, 4500H+B, 5310C. Organic Parameters: EPA 504.1, 524.2.)

Non-Potable Water (<u>Inorganic Parameters</u>: EPA 120.1, 1664A, 200.7, 200.8, 245.1, 300.0, 350.1, 351.1, 351.2, 3005A, 3015, 1312, 6010B, 6010C, 3060A, 353.2, 420.1, 2340B, 6020, 6020A, SM4500S-D, SM4500-CN-CE, Lachat 10-204-00-1-X, 7196A, 7470A, 2310B, 2320B, 2510B, 2540B, 2540C, 2540D, 3500Cr-D, 426C, 4500Cl-E, 4500F-B, 4500F-C,

Serial_No:12101313:00

4500NH3-H, 4500NO2-B, 4500NO3-F, 4500 SO3-B, 4500H-B, 4500PE, 510AC, 5210B, 5310B 5310C, 5540C, 9010Cm 9030B, 9040C. Organic Parameters: EPA 3510C, 3630C, 5030B, 8260B, 608, 624, 625, 8011, 8015C, 8081A, 8081B, 8082, 8082A, 8151A, 8260C, 8270C, 8270D, 8270C-SIM, 8270D-SIM, 8330,)

Solid & Hazardous Waste (Inorganic Parameters: EPA 1010A, 1030, 3060A, 3050B, 1311, 1312, 6010B, 6010C, 6020, , 7196A, 7471A, 7471B, 6020A, 9010C, 9012B, 9030B, 9014, 9038, 9040C, 9045D, 9251, 9050A, 9065. Organic Parameters: EPA 5030B, 5035, 3540C, 3546, 3550B, 3580A, 3620C, 3630C, 6020A, 8260B, 8260C, 8015B, 8015C, 8081A, 8081B, 8082, 8082A, 8151A, 8270C, 8270D, 8270C-SIM, 8270D-SIM, 8330.)

Department of Defense, L-A-B Certificate/Lab ID: L2217.

Drinking Water (Inorganic Parameters: SM 4500H-B. Organic Parameters: EPA 524.2, 504.1.)

Non-Potable Water (Inorganic Parameters: EPA 200.7, 200.8, 6010C, 6020A, 245.1, 7470A, 9040B, 9010B, 180.1, 300.0, 332.0, 6860, 351.1, 353.2, 9060, 1664A, SM 4500CN-E, 4500H-B, 4500Norg-C, 4500NO3-F, 5310C, 2130B, 2320B, 2340B, 2540C, 5540C, 3005A, 3015, 9056, 7196A, 3500-Cr-D. Organic Parameters: EPA 8015C, 8151A, 8260C, 8270D, 8270D-SIM, 8330A, 8082A, 8081B, 3510C, 5030B, MassDEP EPH, MassDEP VPH.)

Solid & Hazardous Waste (Inorganic Parameters: EPA 200.7, 6010C, 6020A, 7471A, 6860, 1311, 1312, 3050B, 7196A, 9040B, 9045C, 9010C, 9012B, 9251, SM3500-CR-D, 4500CN-CE, 2540G, Organic Parameters: EPA 8015C, 8151A, 8260C, 8270D, 8270D-SIM, 8330A/B-prep, 8082A, 8081B, 3540C, 3546, 3580A, 5035A, MassDEP EPH, MassDEP VPH.)

The following analytes are not included in our current NELAP/TNI Scope of Accreditation:

EPA 524.2: Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether. EPA 8260B: 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene. EPA 8260 Non-potable water matrix: lodomethane (methyl iodide), Methyl methacrylate. EPA 8260 Soil matrix: Tert-amyl methyl ether (TAME), Diisopropyl ether (DIPE), Azobenzene. EPA 8330A: PETN, Picric Acid, Nitroglycerine, 2,6-DANT, 2,4-DANT. EPA 8270C: Methyl naphthalene, Dimethyl naphthalene, Total Methylnaphthalenes, Total Dimethylnaphthalenes, 1,4-Diphenylhydrazine. EPA 625: 4-Chloroaniline, 4-Methylphenol. Total Phosphorus in a soil matrix, TKN in a soil matrix, NO2 in a soil matrix, NO3 in a soil matrix. EPA 9071: Total Petroleum Hydrocarbons, Oil & Grease. EPA 9060 in a soil matrix.

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Fax: 978-635-0266 Email: itomei@qeotestir	978-635-0266 emarro@geotesting.com	- □ Standard		USH (only cor	RUSH (only confirmed if pre-approved)		K /3 / 3					⊢ 0
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ANALYTICAL REPORT

Lab Number: L1402089

Client: Geo Testing Express

125 Nagog Park Acton, MA 01720

ATTN: Joe Tomei

Phone: (978) 893-1241

Project Name: SILVERLINE

Project Number: GTX: 301232

Report Date: 01/28/14

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), USDA (Permit #P-330-11-00240), NC (666), TX (T104704476), DOD (L2217), US Army Corps of Engineers.

Eight Walkup Drive, Westborough, MA 01581-1019 508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com



Serial_No:01281419:44

Project Name: Lab Number: SILVERLINE L1402089 **Project Number:** GTX: 301232

Report Date: 01/28/14

Alpha Sample ID Sample Collection Location Date/Time **Client ID**

Not Specified 01/24/14 00:00 L1402089-01 SPT-2, B-28, 9-11 FT



Serial_No:01281419:44

Project Name:SILVERLINELab Number:L1402089Project Number:GTX: 301232Report Date:01/28/14

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. Performance criteria for CAM and RCP methods allow for some LCS compound failures to occur and still be within method compliance. In these instances, the specific failures are not narrated but are noted in the associated QC table. This information is also incorporated in the Data Usability format for our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Michelle M. Morris

Authorized Signature:

Title: Technical Director/Representative

Date: 01/28/14



INORGANICS & MISCELLANEOUS



Serial_No:01281419:44

Project Name: SILVERLINE Lab Number:

L1402089

Project Number: GTX: 301232

Report Date: 01/28/14

SAMPLE RESULTS

Lab ID:

L1402089-01 SPT-2, B-28, 9-11 FT

Client ID: Sample Location:

Not Specified

Matrix:

Soil

Date Collected:

01/24/14 00:00

Date Received:

01/24/14

Field Prep:

Not Specified

Parameter	Result (Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry	- Westborough Lab									
Solids, Total	83.9		%	0.100	NA	1	-	01/24/14 22:23	30,2540G	RT
Chloride	ND		mg/kg	11		1	-	01/28/14 11:31	1,9251	LA
Sulfate	ND		mg/kg	120		1	-	01/27/14 16:30	1,9038	MP



Serial_No:01281419:44

Project Name: Lab Number: SILVERLINE L1402089 Project Number: GTX: 301232

Report Date: 01/28/14

Method Blank Analysis Batch Quality Control

Parameter	Result Qualit	ier Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - W	estborough Lab for	sample(s): 01	Batch:	WG66	6923-1				
Sulfate	ND	mg/kg	100		1	-	01/27/14 16:30	1,9038	MP
General Chemistry - W	estborough Lab for	sample(s): 01	Batch:	WG66	7160-1				
Chloride	ND	mg/kg	10		1	-	01/28/14 11:30	1,9251	LA



Lab Control Sample Analysis Batch Quality Control

L1402089 01/28/14 Lab Number: Report Date: GTX: 301232 SILVERLINE Project Number: Project Name:

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Qual RPD Limits
General Chemistry - Westborough Lab Associated sample(s): 0	ociated sample(s)	_	Batch: WG666923-2					
Sulfate	101				80-121			12
General Chemistry - Westborough Lab Associated sample(s): 0	ociated sample(s)	_	Batch: WG667160-2					
Chloride	86				89-109			35

Page 8 of 15

Matrix Spike Analysis Batch Quality Control

L1402089 01/28/14 Lab Number: Report Date: GTX: 301232 SILVERLINE

Project Number: Project Name:

Parameter	Native Sample	MS Added	MS Found	MS MS MSOund %Recovery Qual Found	MSD Qual Found		MSD Recovery RPD %Recovery Qual Limits
General Chemistry - Westborouç	yh Lab Associ	ated sample	(s): 01	QC Batch ID: V	VG666923-4	QC Sample: L1402089-01	General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG666923-4 QC Sample: L1402089-01 Client ID: SPT-2, B-28, 9-11 FT
Sulfate	Q.	240	240	100	'		22-183 - 12
General Chemistry - Westborouç	yh Lab Associ	ated sample	(s): 01	QC Batch ID: V	VG667160-4	QC Sample: L1402089-01	General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG667160-4 QC Sample: L1402089-01 Client ID: SPT-2, B-28, 9-11 FT
Chloride	Q	462	450	86	•		62-129 - 35

L1402089 01/28/14

Lab Number:

Lab Duplicate Analysis **Batch Quality Control** **RPD Limits**

Qual

Native Sample

GTX: 301232 SILVERLINE

Project Number: Project Name:

20

95.3

95.3

Solids, Total

Parameter

9

9

General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG666923-3 QC Sample: L1402089-01 Client ID: SPT-2, B-28, 9-11 FT General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG667160-3 QC Sample: L1402089-01 Client ID: SPT-2, B-28, 9-11 FT General Chemistry - Westborough Lab Associated sample(s): 01 QC Batch ID: WG666786-1 QC Sample: L1402071-01 Client ID: DUP Sample Report Date: RPD NC SC Units mg/kg mg/kg % **Duplicate Sample**

9

9

35

12



Chloride

Sulfate

Serial_No:01281419:44

Project Name:SILVERLINELab Number:L1402089Project Number:GTX: 301232Report Date:01/28/14

Sample Receipt and Container Information

Were project specific reporting limits specified?

Reagent H2O Preserved Vials Frozen on: NA

Cooler Information Custody Seal

Cooler

A Absent

Container InformationTempContainer IDContainer TypeCoolerpHdeg CPresSealAnalysis(*)L1402089-01ABagAN/A3.6YAbsentCL-9251(28),SO4-9038(28),TS(7)



Serial_No:01281419:44

Project Name:SILVERLINELab Number:L1402089Project Number:GTX: 301232Report Date:01/28/14

GLOSSARY

Acronyms

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

 Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NI - Not Ignitable.

RED Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

 Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

Footnotes

SRM

The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Data Qualifiers

- A Spectra identified as "Aldol Condensation Product".
- -The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit.
- Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations
 of the analyte.
- E Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.
- H The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I The lower value for the two columns has been reported due to obvious interference.

Report Format: Data Usability Report



Serial_No:01281419:44

Project Name:SILVERLINELab Number:L1402089Project Number:GTX: 301232Report Date:01/28/14

Data Qualifiers

- M Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- NJ Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P The RPD between the results for the two columns exceeds the method-specified criteria.
- Q -The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- **R** Analytical results are from sample re-analysis.
- **RE** Analytical results are from sample re-extraction.
- S Analytical results are from modified screening analysis.
- J Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- **ND** Not detected at the reporting limit (RL) for the sample.

Report Format: Data Usability Report



Serial_No:01281419:44

Project Name:SILVERLINELab Number:L1402089Project Number:GTX: 301232Report Date:01/28/14

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

30 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



Certification Information

Last revised December 11, 2013

The following analytes are not included in our NELAP Scope of Accreditation:

Westborough Facility

EPA 524.2: Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether.

EPA 8260C: 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene, Iodomethane (methyl iodide), Methyl methacrylate, Azobenzene.

EPA 8330A/B: PETN, Picric Acid, Nitroglycerine, 2,6-DANT, 2,4-DANT.

EPA 8270D: 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 625: 4-Chloroaniline, 4-Methylphenol.

SM4500: Soil: Total Phosphorus, TKN, NO2, NO3.

EPA 9071: Total Petroleum Hydrocarbons, Oil & Grease.

Mansfield Facility

EPA 8270D: Biphenyl.

EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:

Drinking Water

EPA 200.8: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7**: Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1**: Mercury;

EPA 300.0: Nitrate-N, Fluoride, Sulfate; EPA 353.2: Nitrate-N, Nitrite-N; SM4500NO3-F: Nitrate-N, Nitrite-N; SM4500F-C,

SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B

EPA 332: Perchlorate.

Microbiology: SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.

Non-Potable Water

EPA 200.8: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;

EPA 200.7: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;

EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC,

SM426C, SM4500NH3-BH, EPA 350.1: Ammonia-N, LACHAT 10-107-06-1-B: Ammonia-N, SM4500NO3-F,

EPA 353.2: Nitrate-N, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4,

SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.

EPA 624: Volatile Halocarbons & Aromatics,

EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT,

Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

EPA 625: SVOC (Acid/Base/Neutral Extractables), EPA 600/4-81-045: PCB-Oil.

Microbiology: SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF.

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

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S	MANSFIELD, MA	TEL: 508-822-9300 FAX: 508-822-3288		Client: GeoTesting Express	Nagog Park		MA 01/20	5-0424	5-0266	emarrowgeotesting.com jtomei@geotesting.com	These samples have been previously analyzed by Alpha	Other Project Specific Requirements/Comments/Detection Limits.					SPT-2, B-28, 9-11 ft						:	 :				
4	WESTBORO, MA	TEL: 508-898-9220 FAX: 508-898-9193	Client Information	eoTest	125 Nac		Accon,	9/8-635-0424	978-635-0266	marrowg tomei@ge	samples hav	Project S			*: :	ALPHA Lab ID (Lab Use Only)	1164020											

Page 15 of 15

Serial_No:12261306:59



ANALYTICAL REPORT

Lab Number: L1325678

Client: Geo Testing Express

125 Nagog Park Acton, MA 01720

ATTN: Joe Tomei

Phone: (978) 893-1241

Project Name: SILVERLINE

Project Number: GTX :301232

Report Date: 12/26/13

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), USDA (Permit #P-330-11-00240), NC (666), TX (T104704476), DOD (L2217), US Army Corps of Engineers.

Eight Walkup Drive, Westborough, MA 01581-1019 508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com



Serial_No:12261306:59

Project Name: Lab Number: SILVERLINE L1325678 **Project Number:** GTX:301232

Report Date: 12/26/13

Alpha Sample ID	Client ID	Sample Location	Collection Date/Time
L1325678-01	SPT-1, B-24, 2-4 FT	Not Specified	12/18/13 00:00
L1325678-02	SPT-1, B-33, 2-4 FT	Not Specified	12/18/13 00:00



Serial_No:12261306:59

Project Name:SILVERLINELab Number:L1325678Project Number:GTX :301232Report Date:12/26/13

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. Performance criteria for CAM and RCP methods allow for some LCS compound failures to occur and still be within method compliance. In these instances, the specific failures are not narrated but are noted in the associated QC table. This information is also incorporated in the Data Usability format for our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Cypellia for Chen Cynthia McQueen

Authorized Signature:

Title: Technical Director/Representative

Date: 12/26/13



INORGANICS & MISCELLANEOUS



Serial_No:12261306:59

Project Name: Lab Number: SILVERLINE L1325678 Project Number: GTX:301232

Report Date: 12/26/13

SAMPLE RESULTS

Lab ID: L1325678-01 Date Collected: 12/18/13 00:00

SPT-1, B-24, 2-4 FT Date Received: Client ID: 12/18/13 Not Specified Not Specified Sample Location: Field Prep:

Matrix: Soil

Parameter	Result Q	ualifier Un	its RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry -	Westborough Lab								
Solids, Total	89.6	9/	0.100	NA	1	-	12/18/13 23:24	30,2540G	RT
Chloride	38	mg	kg 11		1	-	12/24/13 09:12	1,9251	LA
Sulfate	120	mg	kg 110		1	-	12/20/13 14:15	1,9038	MP



Serial_No:12261306:59

Not Specified

Project Name: Lab Number: SILVERLINE L1325678 Project Number: GTX:301232

Report Date: 12/26/13

SAMPLE RESULTS

Lab ID: L1325678-02 Date Collected: 12/18/13 00:00 SPT-1, B-33, 2-4 FT Date Received: Client ID: 12/18/13

Not Specified Sample Location: Field Prep:

Matrix: Soil

Parameter	Result (Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry	- Westborough Lab									
Solids, Total	96.1		%	0.100	NA	1	-	12/18/13 23:24	30,2540G	RT
Chloride	ND		mg/kg	10		1	-	12/24/13 09:13	1,9251	LA
Sulfate	ND		mg/kg	100		1	-	12/20/13 14:15	1,9038	MP



Serial_No:12261306:59

Project Name: Lab Number: SILVERLINE L1325678 Project Number: GTX:301232

Report Date: 12/26/13

Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - V	Westborough Lab for sam	nple(s): 01	-02 Ba	atch: Wo	G660563-1				
Sulfate	ND	mg/kg	100		1	-	12/20/13 14:15	1,9038	MP
General Chemistry - V	Westborough Lab for sam	nple(s): 01	-02 Ba	atch: Wo	G661235-1				
Chloride	ND	mg/kg	1.0		1	-	12/24/13 09:04	1,9251	LA



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Lab Control Sample Analysis Batch Quality Control

GTX:301232 SILVERLINE

Project Number: Project Name:

L1325678 12/26/13 Lab Number: Report Date:

Parameter	LCS %Recovery	Qual	LCSD %Recovery Qual		%Recovery Limits	RPD	Qual	RPD Qual RPD Limits
General Chemistry - Westborough Lab Associated sample(s):	ociated sample(s		01-02 Batch: WG660563-2	01				
Sulfate	100				80-121			12
General Chemistry - Westborough Lab Associated sample(s):	ociated sample(s		01-02 Batch: WG661235-2	01				
Chloride	93				89-109	,		35

Matrix Spike Analysis Batch Quality Control

L1325678 12/26/13 Lab Number: Report Date:

GTX:301232 SILVERLINE

Project Number: Project Name:

Parameter	Native Sample	MS Added	MS Found	MS MS MSD Found %Recovery Qual Found	MSD Qual Found	MSD Recovery RPD Wall Limits	
General Chemistry - Westborough Lab Associated sample(h Lab Assoc	siated sampl	e(s): 01-02	QC Batch ID	: WG660563-	(s): 01-02 QC Batch ID: WG660563-4 QC Sample: L1325601-02 Client ID: MS Sample	
Sulfate	Q	244	290	120	•	. 22-183 - 12	
General Chemistry - Westborough Lab Associated sample(h Lab Assoc	siated sampl	e(s): 01-02	QC Batch ID	: WG661235-4	(s): 01-02 QC Batch ID: WG661235-4 QC Sample: L1325601-02 Client ID: MS Sample	
Chloride	170	408	029	91	•	- 62-129 - 35	

Lab Duplicate Analysis
Batch Quality Control

GTX:301232 SILVERLINE

Project Number: Project Name:

L1325678 12/26/13

Lab Number: Report Date:

Parameter	Native Sample	Duplicate Sample Units	e Units	RPD	RPD Qual	RPD Limits
General Chemistry - Westborough Lab Associated sample(s):	_	01-02 QC Batch ID: WG660124-1 QC Sample: L1324748-19 Client ID: DUP Sample	QC Sample: L13	324748-19	Client ID: D	UP Sample
Solids, Total	84.1	84.8	%	_		20
General Chemistry - Westborough Lab Associated sample(s):	_	01-02 QC Batch ID: WG660563-3 QC Sample: L1325601-01 Client ID: DUP Sample	QC Sample: L13	325601-01	Client ID: D	UP Sample
Sulfate	ND	Q	mg/kg	O _N		12
General Chemistry - Westborough Lab Associated sample(s):	_	01-02 QC Batch ID: WG661235-3 QC Sample: L1325601-02 Client ID: DUP Sample	QC Sample: L13	325601-02	Client ID: D	UP Sample
Chloride	170	180	mg/kg	9		35

Serial_No:12261306:59

Project Name:SILVERLINELab Number:L1325678Project Number:GTX:301232Report Date:12/26/13

Sample Receipt and Container Information

Were project specific reporting limits specified?

Reagent H2O Preserved Vials Frozen on: NA

Cooler Information Custody Seal

Cooler

A Absent

Container Info	rmation			Temp			
Container ID	Container Type	Cooler	рН	deg C	Pres	Seal	Analysis(*)
L1325678-01A	Bag	Α	N/A	2.9	Y	Absent	CL-9251(28),SO4- 9038(28),TS(7)
L1325678-02A	Bag	Α	N/A	2.9	Υ	Absent	CL-9251(28),SO4- 9038(28),TS(7)



Serial_No:12261306:59

Project Name:SILVERLINELab Number:L1325678Project Number:GTX:301232Report Date:12/26/13

GLOSSARY

Acronyms

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

 Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NI - Not Ignitable.

RED Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

 Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

Footnotes

SRM

 The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Data Qualifiers

- A Spectra identified as "Aldol Condensation Product".
- -The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit.
- Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations
 of the analyte.
- E Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.
- H The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I The lower value for the two columns has been reported due to obvious interference.

Report Format: Data Usability Report



Serial_No:12261306:59

Project Name:SILVERLINELab Number:L1325678Project Number:GTX :301232Report Date:12/26/13

Data Qualifiers

- $\label{eq:MCPCAM} \textbf{M} \qquad \text{-Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.}$
- NJ Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P The RPD between the results for the two columns exceeds the method-specified criteria.
- Q -The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- **R** Analytical results are from sample re-analysis.
- **RE** Analytical results are from sample re-extraction.
- S Analytical results are from modified screening analysis.

Report Format: Data Usability Report



Serial_No:12261306:59

Project Name:SILVERLINELab Number:L1325678Project Number:GTX:301232Report Date:12/26/13

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

30 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



Serial_No:12261306:59

Certification Information

Last revised December 11, 2013

The following analytes are not included in our NELAP Scope of Accreditation:

Westborough Facility

EPA 524.2: Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether.

EPA 8260C: 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene, Iodomethane (methyl iodide), Methyl methacrylate, Azobenzene.

EPA 8330A/B: PETN, Picric Acid, Nitroglycerine, 2,6-DANT, 2,4-DANT.

EPA 8270D: 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 625: 4-Chloroaniline, 4-Methylphenol.

SM4500: Soil: Total Phosphorus, TKN, NO2, NO3.

EPA 9071: Total Petroleum Hydrocarbons, Oil & Grease.

Mansfield Facility

EPA 8270D: Biphenyl.

EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:

Drinking Water

EPA 200.8: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7**: Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1**: Mercury;

EPA 300.0: Nitrate-N, Fluoride, Sulfate; EPA 353.2: Nitrate-N, Nitrite-N; SM4500NO3-F: Nitrate-N, Nitrite-N; SM4500F-C,

SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B

EPA 332: Perchlorate.

Microbiology: SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.

Non-Potable Water

EPA 200.8: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;

EPA 200.7: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;

EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC,

SM426C, SM4500NH3-BH, EPA 350.1: Ammonia-N, LACHAT 10-107-06-1-B: Ammonia-N, SM4500NO3-F,

EPA 353.2: Nitrate-N, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4,

SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.

EPA 624: Volatile Halocarbons & Aromatics,

EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT,

Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

EPA 625: SVOC (Acid/Base/Neutral Extractables), EPA 600/4-81-045: PCB-Oil.

Microbiology: SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF.

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

				:			**: *															
ALPHA Job #: //3257778	Same as Client info PO#:							SAMPLE HANDLING	/ Filtration	eded	Preservation T	(Please specify below) Sample Specific Comments		1					Please print clearly, legibly and completely. Samples can not be logged	in and turnaround time clock will not	\Box	See reverse side.
Date Recid in Lab: $ \mathcal{J}/ \mathcal{S} / \mathcal{J} $ ALI Report Information - Data Deliverables	Z)	☐ ADEx ☐ Add'l Deliverables	rements/Rep	State /red Program						AM	(0-14)	Ches. 1	<i>X</i>	メ メ					Bag		THE CONFECT (WICE 13 WE	Gyndella
PAGE10F			<u>«</u>	ā			(jpehordda-ard	:• •				Sample Sampler's /	Soil	Soil					Container Type B		(2/8/3 /3.4/	21818
<u>}</u>	Project Name: Silverline	Project Location:	Project #: GTX: 301232	Project Manager: Joe Tomei	ALPHA Quote #:	Turn-Around Time	A Standard 口 RUSH [may	Date Due: 12/27/13	ts/Detection Limits:			Collection Date Time									Kelindulshed by:) \ \max
AIN OF	MANSFIELD, MA TEL: 508-822-9300 FAX: 508-822-3288			Park	01720		, moo . gi	nalyzed by Alpha	Other Project Specific Requirements/Comments/Detection Li			Sample ID	SPT-1, B-24, 2-4 ft	SPT-1, B-33, 2-4 ft		1						1-07)
	WESTBORO, MA TEL: 508-898-9220 FAX: 508-898-9193	Client Information	Client GeoTesting Express	Address: 125 Nagog	Acton, MA	Phone: 978-635-0424	Fax: 978-635-0266 Email: jtomei@geotestir	☐ These samples have	Other Project Spe			ALPHA Lab ID (Lab Use Only)	19-36938	2p								FORM NO: 01-01 (rev. 14-OCT-07)

Page 16 of 16



ANALYTICAL REPORT

Lab Number: L1401425

Client: Geo Testing Express

125 Nagog Park Acton, MA 01720

ATTN: Joe Tomei

Phone: (978) 893-1241

Project Name: SILVERLINE

Project Number: GTX: 301232

Report Date: 01/20/14

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Certifications & Approvals: MA (M-MA086), NY (11148), CT (PH-0574), NH (2003), NJ NELAP (MA935), RI (LAO00065), ME (MA00086), PA (68-03671), USDA (Permit #P-330-11-00240), NC (666), TX (T104704476), DOD (L2217), US Army Corps of Engineers.

Eight Walkup Drive, Westborough, MA 01581-1019 508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com



Serial_No:01201420:41

Project Name:SILVERLINELab Number:L1401425Project Number:GTX: 301232Report Date:01/20/14

Alpha Sample ID	Client ID	Sample Location	Collection Date/Time
L1401425-01	BULK, B-50, 1-5 FT	Not Specified	01/15/14 00:00
L1401425-02	SPT-1, B-53, 6-8 FT	Not Specified	01/15/14 00:00



Serial_No:01201420:41

Project Name:SILVERLINELab Number:L1401425Project Number:GTX: 301232Report Date:01/20/14

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet all of the requirements of NELAC, for all NELAC accredited parameters. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively. When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. Performance criteria for CAM and RCP methods allow for some LCS compound failures to occur and still be within method compliance. In these instances, the specific failures are not narrated but are noted in the associated QC table. This information is also incorporated in the Data Usability format for our Data Merger tool where it can be reviewed along with any associated usability implications. Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances the specific failure is not narrated but noted in the associated QC table. The information is also incorporated in the Data Usability format of our Data Merger tool where it can be reviewed along with any associated usability implications.

Please see the associated ADEx data file for a comparison of laboratory reporting limits that were achieved with the regulatory Numerical Standards requested on the Chain of Custody.

HOLD POLICY

For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Client Service Representative and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Client Services at 800-624-9220 with any questions.



Serial_No:01201420:41

Project Name:SILVERLINELab Number:L1401425Project Number:GTX: 301232Report Date:01/20/14

Case Narrative (continued)

Sample Receipt

The sample collection date was specified by the client.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Michelle M. Morris

Authorized Signature:

Title: Technical Director/Representative

Date: 01/20/14



INORGANICS & MISCELLANEOUS



Serial_No:01201420:41

Project Name: SILVERLINE Lab Number:

L1401425

Project Number: GTX: 301232

Report Date:

01/20/14

SAMPLE RESULTS

Lab ID: L1401425-01 Client ID:

BULK, B-50, 1-5 FT

Sample Location: Matrix:

01/15/14 00:00

Date Collected: Date Received:

01/15/14

Not Specified Soil

Field Prep:

Not Specified

Parameter	Result (Qualifier Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry -	Westborough Lab								
Solids, Total	88.4	%	0.100	NA	1	-	01/16/14 00:47	30,2540G	RT
Chloride	ND	mg/kg	11		1	-	01/20/14 11:05	1,9251	LA
Sulfate	ND	mg/kg	110		1	-	01/17/14 17:45	1,9038	MP



Serial_No:01201420:41

Project Name: SILVERLINE Lab Number:

L1401425

Project Number: GTX: 301232

Report Date:

01/20/14

SAMPLE RESULTS

Lab ID:

L1401425-02

Client ID:

SPT-1, B-53, 6-8 FT

Sample Location:

Not Specified

Matrix:

Soil

Date Collected:

01/15/14 00:00

Date Received:

01/15/14

Field Prep:

Not Specified

Parameter	Result Qual	ifier Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry	- Westborough Lab								
Solids, Total	23.0	%	0.100	NA	1	-	01/16/14 00:47	30,2540G	RT
Chloride	3700	mg/kg	39		1	-	01/20/14 11:05	1,9251	LA
Sulfate	5000	ma/ka	2200		5	_	01/17/14 17:45	1.9038	MP



Serial_No:01201420:41

Project Name: Lab Number: SILVERLINE L1401425 Project Number: GTX: 301232

Report Date: 01/20/14

Method Blank Analysis Batch Quality Control

Parameter	Result Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - We	stborough Lab for sar	mple(s): 01	-02 Ba	itch: W	G665035-1				
Sulfate	ND	mg/kg	100		1	-	01/17/14 17:45	1,9038	MP
General Chemistry - We	estborough Lab for sar	mple(s): 01	-02 Ba	itch: W	G665663-1				
Chloride	ND	mg/kg	10		1	-	01/20/14 10:14	1,9251	LA



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Lab Control Sample Analysis Batch Quality Control

GTX: 301232 SILVERLINE

Project Number: Project Name:

L1401425 01/20/14 Lab Number: Report Date:

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Qual RPD Limits	1
General Chemistry - Westborough Lab Associated sample(s): 01	Associated sample(s)): 01-02	-02 Batch: WG665035-2	2-5					
Sulfate	94				80-121			12	
General Chemistry - Westborough Lab Associated sample(s): 01	Associated sample(s)): 01-02	-02 Batch: WG665663-2	3-2					
Chloride	104				89-109	,		35	11

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Matrix Spike Analysis Batch Quality Control

SILVERLINE	Lab Number:	L1401425
GTX: 301232	Report Date:	01/20/14

Project Number: Project Name:

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	MS MS MSO ound %Recovery Qual Found	MSD Recovery RPD %Recovery Qual Limits
General Chemistry - Westborou, FT	gh Lab Assoo	ciated sampl	e(s): 01-02	QC Batch II	D: WG665035-4	General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG665035-4 QC Sample: L1401425-02 Client ID: SPT-1, B-53, 6-8 = T
Sulfate	2000	870	6200	140	•	. 22-183 - 12
General Chemistry - Westborou	gh Lab Asso	siated sampl	e(s): 01-02	QC Batch II	J: WG665663-4	General Chemistry - Westborough Lab Associated sample(s): 01-02 QC Batch ID: WG665663-4 QC Sample: L1401427-01 Client ID: MS Sample
Chloride	17	422	450	107	•	- 62-129 - 35

35

1

mg/kg

19

17

Lab Duplicate Analysis Batch Quality Control

GTX: 301232 SILVERLINE

Project Number: Project Name:

L1401425 01/20/14 Report Date:

Lab Number:

Parameter	Native Sample	ole Duplicate Sample Units	le Units	RPD	Qual	RPD Qual RPD Limits
General Chemistry - Westborough Lab Associated sample(s):		01-02 QC Batch ID: WG664924-1 QC Sample: L1401288-01 Client ID: DUP Sample	QC Sample: L'	1401288-01	Client ID: D	UP Sample
Solids, Total	76.3	77.2	%	~		20
General Chemistry - Westborough Lab Associated sample(s): FT		01-02 QC Batch ID: WG665035-3 QC Sample: L1401425-01 Client ID: BULK, B-50, 1-5	QC Sample: L'	1401425-01	Client ID: B	ULK, B-50, 1-5
Sulfate	QN	QN	mg/kg	N		12
General Chemistry - Westborough Lab Associated sample(s):		01-02 QC Batch ID: WG665663-3 QC Sample: L1401427-01 Client ID: DUP Sample	QC Sample: L'	1401427-01	Client ID: D	UP Sample



Chloride

Serial_No:01201420:41

Project Name:SILVERLINELab Number:L1401425Project Number:GTX: 301232Report Date:01/20/14

Sample Receipt and Container Information

Were project specific reporting limits specified?

Reagent H2O Preserved Vials Frozen on: NA

Cooler Information Custody Seal

Cooler

A Absent

Container Info	rmation			Temp			
Container ID	Container Type	Cooler	рН	deg C	Pres	Seal	Analysis(*)
L1401425-01A	Bag	А	N/A	2.8	Υ	Absent	CL-9251(28),SO4- 9038(28),TS(7)
L1401425-02A	Bag	Α	N/A	2.8	Υ	Absent	CL-9251(28),SO4- 9038(28),TS(7)



Serial_No:01201420:41

Project Name:SILVERLINELab Number:L1401425Project Number:GTX: 301232Report Date:01/20/14

GLOSSARY

Acronyms

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EPA - Environmental Protection Agency

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

 Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NI - Not Ignitable.

RED Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

Footnotes

 The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Data Qualifiers

- A Spectra identified as "Aldol Condensation Product".
- -The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit.
- Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations
 of the analyte.
- E Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- G The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.
- H The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I The lower value for the two columns has been reported due to obvious interference.

Report Format: Data Usability Report



Serial_No:01201420:41

Project Name:SILVERLINELab Number:L1401425Project Number:GTX: 301232Report Date:01/20/14

Data Qualifiers

- M Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- NJ Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.
- P The RPD between the results for the two columns exceeds the method-specified criteria.
- The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- **R** Analytical results are from sample re-analysis.
- **RE** Analytical results are from sample re-extraction.
- S Analytical results are from modified screening analysis.

Report Format: Data Usability Report



Serial_No:01201420:41

Project Name:SILVERLINELab Number:L1401425Project Number:GTX: 301232Report Date:01/20/14

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

30 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



Certification Information

Last revised December 11, 2013

The following analytes are not included in our NELAP Scope of Accreditation:

Westborough Facility

EPA 524.2: Acetone, 2-Butanone (Methyl ethyl ketone (MEK)), Tert-butyl alcohol, 2-Hexanone, Tetrahydrofuran, 1,3,5-Trichlorobenzene, 4-Methyl-2-pentanone (MIBK), Carbon disulfide, Diethyl ether.

EPA 8260C: 1,2,4,5-Tetramethylbenzene, 4-Ethyltoluene, Iodomethane (methyl iodide), Methyl methacrylate, Azobenzene.

EPA 8330A/B: PETN, Picric Acid, Nitroglycerine, 2,6-DANT, 2,4-DANT.

EPA 8270D: 1-Methylnaphthalene, Dimethylnaphthalene,1,4-Diphenylhydrazine.

EPA 625: 4-Chloroaniline, 4-Methylphenol.

SM4500: Soil: Total Phosphorus, TKN, NO2, NO3.

EPA 9071: Total Petroleum Hydrocarbons, Oil & Grease.

Mansfield Facility

EPA 8270D: Biphenyl.

EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.

The following analytes are included in our Massachusetts DEP Scope of Accreditation, Westborough Facility:

Drinking Water

EPA 200.8: Sb,As,Ba,Be,Cd,Cr,Cu,Pb,Ni,Se,Tl; **EPA 200.7**: Ba,Be,Ca,Cd,Cr,Cu,Na; **EPA 245.1**: Mercury;

EPA 300.0: Nitrate-N, Fluoride, Sulfate; EPA 353.2: Nitrate-N, Nitrite-N; SM4500NO3-F: Nitrate-N, Nitrite-N; SM4500F-C,

SM4500CN-CE, EPA 180.1, SM2130B, SM4500CI-D, SM2320B, SM2540C, SM4500H-B

EPA 332: Perchlorate.

Microbiology: SM9215B; SM9223-P/A, SM9223B-Colilert-QT, Enterolert-QT.

Non-Potable Water

EPA 200.8: Al,Sb,As,Be,Cd,Cr,Cu,Pb,Mn,Ni,Se,Ag,Tl,Zn;

EPA 200.7: Al,Sb,As,Be,Cd,Ca,Cr,Co,Cu,Fe,Pb,Mg,Mn,Mo,Ni,K,Se,Ag,Na,Sr,Ti,Tl,V,Zn;

EPA 245.1, SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2340B, SM2320B, SM4500CL-E, SM4500F-BC,

SM426C, SM4500NH3-BH, EPA 350.1: Ammonia-N, LACHAT 10-107-06-1-B: Ammonia-N, SM4500NO3-F,

EPA 353.2: Nitrate-N, SM4500NH3-BC-NES, EPA 351.1, SM4500P-E, SM4500P-B, E, SM5220D, EPA 410.4,

SM5210B, SM5310C, SM4500CL-D, EPA 1664, SM14 510AC, EPA 420.1, SM4500-CN-CE, SM2540D.

EPA 624: Volatile Halocarbons & Aromatics,

EPA 608: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs

EPA 625: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.

Microbiology: SM9223B-Colilert-QT; Enterolert-QT, SM9222D-MF.

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

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	シスト(0カ)フ:#.gor wyshana	Billing Information	Ճ Same as Client info PO #:							T ONI ICHALI EI ICHARO	Filtration	# □ Done □ Not needed	☐ Lab to do B Preservation	سر mments								Please print clearly, legibly and com-	pletely. Samples can not be logged in and trimarching time clock will not	
	1/18/11	Report Information - Data Deliverables Bill		☐ Add'l Deliverables	Regulatory Requirements/Report Limits	gram Criteria	·																	Received By: Date/Time
	Date Rec'd in Lab:	Report Infor	□ FAX	D ADEX	Regulatory Re	State /Fed Program				SI	\$\\ \$\langle 17	Z.	5494 1914	_s	メ	×						ype Bag	tive NA	
1000	- - - - -								RUSH tenty confirmed if pre-approvedil)	Time:				Sample Matrix	Soil	Soil					-	Container Type	Preservative	Date/Time
:USTODY		Project Information	Project Name: Silverline	Project Location:	Project #: GTX: 301232	Project Manager: Joe Tomei	ALPHA Quote #:	Turn-Around Time	☑ Standard □ RUSH	01/23/13	office Lastron	s/Detection Limits.		Collection Date Time										Relinquished By:
CHAIN OF CUSTOD		MANSFIELD, MA		Proj			01720 ALF		:	T	viously analyzed by Alpha	Otter right, specific requirements/Confidents/Detection Limits.		Sample ID	Bulk, B-50, 1-5 ft	SPT-1, B-53, 6-8 ft			:					See
	עויליועי			Client Information	Client GeoTesting Express	Address: 125 Nagog Park	Acton, MA 017	Phone: 978-635-0424	Fax: 978-635-0266	Email: jtomei@geotesting.com	These samples have been previously analyzed by Alpha	aner riojed opediic r		ALPHA Lab ID (Lab Use Only)	<i>OI42く〜o</i> ! Bulk, B.	. SPT-1,								

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Client: AECOM
Project Name: Silverline
Project Location: Chelsea, MA
GTX #: 301232

Test Date: 1/17/2014

Tested By: daa/mth
Checked By: jdt

Bulk Density and Compressive Strength of Rock Core Specimens by ASTM D7012 Method C

Boring ID	Sample ID	Depth, ft	Bulk Density, lb/ft ³	Compressive Strength, psi	Failure Type	In conformance with ASTM D4543
B-47	Run 1	104.44-104.81	168	4,339	2	YES

Notes:

Density determined on core samples by measuring dimensions and weight and then calculating.

All specimens tested at the approximate as-received moisture content and at standard laboratory temperature.

Failure Type: 1 = Intact Material Failure; 2 = Discontinuity Failure (See attached photographs)

0.00055

Slope of Best Fit Line Angle of Best Fit Line:

End 1:

DIAMETER 1

0.00051 0.00229

Slope of Best Fit Line: Angle of Best Fit Line:

End 2:

Maximum Angular Difference:

YES

Parallelism Tolerance Met? Spherically Seated

Client:	AECOM	Test Date:	1/17/2014
Project Name:	Silverline	Tested By:	daa/mth
Project Location:	Chelsea, MA	Checked By:	jat
GTX #:	301232		
Boring ID:	B-47		
Sample ID:	Run 1		
Depth:	104.44-104.81 ft		
Visual Description:	See photographs		

Silverline Tested By: Chalsea, MA Checked By: 301322 B-47 Run 1 1044-104.81 ft	Client:		Test Date:	1/17/2014
Project Location: Chekea, MA Checked By: GTX #: 301232 Checked By: GTX #: 301232 Checked By: BGTX #: 301232 Checked By: <	Project Name:		Tested By:	daa/mth
GTX #: Boring ID: Sample ID: Depth:	Project Location:	Chelsea, MA	Checked By:	jdt
Boring ID: Sample ID: Depth:	GTX #:	301232		
Ġ	Boring ID:	B-47		
į		Run 1		
		104.44-104.81 ft		
	Visual Description:	See photographs		

	Project	Project Name	Silverline				Tested By:	daa/mth						
Tool	Projec	Project Location:	Chelsea, MA				Checked By:	Jdt						
	GTX #:		301232											
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Boring ID:	ID:	B-47											
EXPRESS	Sample ID:	e ID:	Run 1											
	Depth:		104.44-104.81 ft											
	Visual	Visual Description:	See photographs											
LINO	WEIGHT	UNIT WEIGHT DETERMINATION AND	ION AND DI	MENSION	AL AND	SHAPE T	OLERANCI	DIMENSIONAL AND SHAPE TOLERANCES OF ROCK CORE SPECIMENS BY ASTM D4543	K CORE	SPECIME	NS BY AS	TM D4543	~	
BULK DENSITY						_	DEVIATION FRO	DEVIATION FROM STRAIGHTNESS (Procedure S1)	SS (Procedure	S1)				
	-		2	Average	Ф									
Specimen Length, in:	4.32		4.32	4.32				Maximum gap between side of core and reference surface plate:	tween side of co	e and reference	e surface plate:			
Specimen Diameter, in:	1.99		1.99	1.99					Is the max	Is the maximum gap ≤ 0.02 in.?	02 in.?	YES		
Specimen Mass, g:	593.12													
Bulk Density, Ib/ft ³	168	Minimum Di	Minimum Diameter Tolerence Met?	Met?	YES				Σ	aximum differer	Maximum difference must be < 0.020 in.	.020 in.		
Length to Diameter Ratio:	2.2	Length to D	ength to Diameter Ratio Tole	Tolerance Met?	YES					St	Straightness Tolerance Met?	erance Met?	YES	
END FLATNESS AND PARALLELISM (Procedure FP1)	M (Procedure FI	91)												
END 1	-0.875 -C	-0.750 -0.625	-0.500	-0.375	-0.250	-0.125	0.000	0.125	0.250	0.375	0.500	0.625	0.750	0.875
Diameter 1, in -0		-0.00050 -0.00050	-0.00040	-0.00020	-0.00020	-0.00010	0.00000	0.00000	0.00010	0.00020	0.00020	0.00030	0.00030	0.00040
Diameter 2, in (rotated 90°) 0.	0.000070 0.0	0.00060 0.00050	0.00050	0.00040	0.00030	0.00010	0.00000	-0.00010	-0.00010	-0.00020	-0.00030	-0.00050	-0.00060	-0.00060
														_

0.500 0.625 0.00020 0.00030 0.00030 -0.00030 max and min readings, in: 0.0009 9° = 9 must be < 0.0020 in. Dif Flatness Tolerance Met?	0.375 0.500 0.625 0.00010 0.00020 0.00030 -0.00010 -0.00030 -0.00030 ifference between max and min readings, in: 0.0009 0.0 0.0009 aximum difference must be < 0.0000 in: Flatness Tolerance Met?	0.375 0.500 0.625 0.00010 0.00020 0.00030 -0.00010 -0.00030 -0.00030 Difference between max and min readings, in: 0° = 0.0009 Maximum difference must be < 0.0020 in: Flatness Tolerance Met.	0.250		0.125 0.00000 0.00000	0.000 0.125 0.00000 0.00000 0.00000 0.00000		0.00000
-0.00030 readings, ir 90° =	-0.00030 en max and min 0.0009	-0.00010 Difference betwee	0.00000	0	0.0000		0.00000	0.00010 0.00000
0.625	0.500	0.375	0.250	. O	0.0000		0.0000	-0.125 0.000 -0.00010 0.00000
= ,06	0.00000	0,0						
readings, in:	ifference between max and min readings, in:	Difference between						
-0.00050	-0.00030	-0.00020	-0.00010	0	-0.0001		0.00000	0.00010 0.00000
0.00030	0.00020	0.00020	0.00010	С	0.00000	0.00000	_	0.00000
0.625	0.500	0.3/5	0.250		0.125		0.000	0.000

-0.500 -0.00030 0.00050

-0.625 -0.00040 0.00060

-0.750 -0.00050 0.00060

-0.875 -0.00050 0.00070

END 2 Diameter 1, in Diameter 2, in (rotated 90°)

y = 0.00055x - 0.00006

End 1 Diameter 1

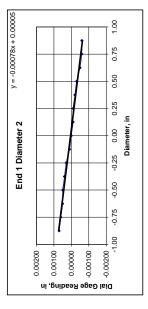
0.875 0.00040 -0.00060

0.750 0.00030 -0.00050

0.00130

Difference = + 0.00065

0.0013



1.00

0.75

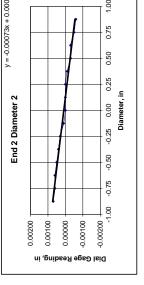
0.50

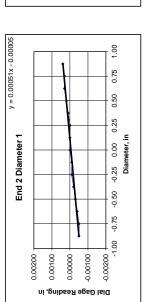
-0.25 0.00 0.25

-0.50 -0.75

-1.00

Diameter, in





					ū	2	End 2 Diameter 2	Jete	2					
	0000													
uį 'f	0.00200													
guibe	0.00100	•	1	1	+	1	Ц							
ge Re	0.00000								l			1	1	Ι.
	-0.00100													
	-0.00200 	8.	- - - -	. 22	-0.50	۲	-1.00 -0.75 -0.50 -0.25 0.00 0.25	+ 00	0	25	0.5	0.50	0.75	1.00
							Dia	mete	Diameter, in					

-0.00078

Slope of Best Fit Line: Angle of Best Fit Line:

End 1:

DIAMETER 2

-0.00073 -0.04183

Slope of Best Fit Line Angle of Best Fit Line:

End 2:

Maximum Angular Difference:

0.00286

YES

Parallelism Tolerance Met? Spherically Seated

PERPENDICULARITY (Procedure P1) (Calculated from End Flatness and Parallelism measurements above)	(Calculated from End Flatness ar	nd Parallelism me.	asurements ab	ove)			
END 1 Diffe	Difference, Maximum and Minimum (in.) Diameter (in.) Slope	Diameter (in.)	Slope	Angle°	Perpendicularity Tolerance Met?	Maximum angle of departure must be ≤ 0.25°	
Diameter 1, in	0.00090	1.990	0.00045	0.026	YES		
Diameter 2, in (rotated 90°)	0.00130	1.990	0.00065	0.037	YES	Perpendicularity Tolerance Met?	YES
END 2							
Diameter 1, in	0.00000	1.990	0.00045	0.026	YES		
Diameter 2, in (rotated 90°)	0.00130	1.990	0.00065	0.037	YES		

0.00200



Client: **AECOM** Project Name: Silverline Project Location: Chelsea, MA GTX #: 301232 Test Date: 1/17/2014 Tested By: daa/mth Checked By: jdt B-47 Boring ID: Sample ID: Run 1 Depth, ft: 104.44-104.81



After cutting and grinding



After break